ENGINEERING NEWS-RECORD

March 29, 1945

In This Issue

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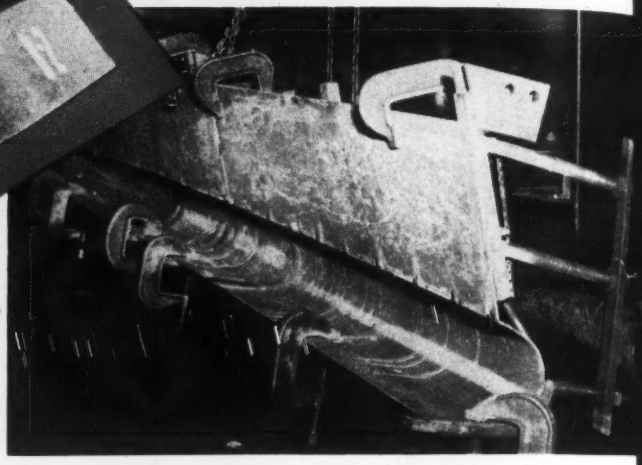
BYERS WROUGHT IRON gives these gutters a chance



to grow old!

Balancing the life of various parts of a building so they will all grow old together is a universal engineering principle. And in some recent roof replacements at the Union Switch and Signal Company Plant, Swissvale, Pa., wrought iron was used for gutters, to help put the principle into practice.

Gutters on industrial buildings are exposed to particularly severe attack, both from the atmosphere and from the run-off waters which are generally highly aggressive. Extending the life of gutters by periodical painting means continuous trouble and expense—and if for any reason such maintenance must be delayed, premature failures may occur.

The unusual durability of wrought iron under such conditions has been demonstrated not only in gutters themselves, but in the roofing and siding of plant buildings, which are exposed to the same corrosive attack. To quote one typical example from many: the old Union Station at Atlanta, Ga., built in 1871, was razed in 1930. The original wrought iron roof was still in good condition, and an old employee remarked that it was the "only metal about the place that had not been replaced at one time or another."

The resistance of wrought iron to corrosion in applications like these is not confined to the surface, but goes all the way through. Tiny fibers of glass-like silicate slag are threaded through a matrix of high-purity iron, and act almost like a picket fence in halting and dispersing corrosive attack. Then, too, the fibers help to anchor the initial protective film, which shields the underlying metal just as a scab protects a wound.

Our General Catalog will give you full dimensional information on wrought iron sheets and plates. May we send you a copy?

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JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 134 MARCH 22, 1945 No. 12

COMING NEXT

• CONSTRUCTION COST NUMBER, to be published April 5, features *ENR's* annual round-up of statistical data. Cost indexes—general and special, labor rates, material prices, insurance rates and housing cost will be included. In addition, there will be many pages of unit prices on jobs that were let in 1944. Also featured are two timely articles relating to estimating and bidding and time studies on construction projects.

• In the April 5 issue, Waldo Bowman, editor of *ENR*, reports on reconstruction of harbor facilities in the European Theatre of Operations. These facilities, which were destroyed by Allied bombing and shelling—followed by Nazi demolition work, has called for the exercise of considerable ingenuity. How these harbors, with their locked basins and required bridges, are being restored to usefulness is told by Mr. Bowman, from on-the-site observation.

• European engineers have made extensive progress in the practical application of artificially induced stresses in concrete structures beyond the stage of development in the United States. The manner of prestressing differs considerably from current practice in this country. How European engineers have handled this important problem will be discussed in the April 5 issue.

LOOKING AHEAD

• The ingenuity of the Seabees, and their brilliant accomplishments in this war, has produced many construction innovations that are likely to become standard practice on peacetime work. How one of these Navy Construction Battalions devised and adapted available equipment for service as a seagoing barge from which to drill and blast a two-mile channel through a coral reef, offshore of the Solomon Island, will be described in an early issue.

• The problem of designing rectangular steel-plate tanks will be discussed in an early issue. Assuming that the plate panels between reinforcing stiffeners act as simple beam spans, charts for obtaining thickness of plate, spacing of stiffeners, and loads offers a time-saving design method.

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Number of copies of this issue printed: 36,064

DO YOU WANT AN INDEX?

Due to the paper shortage, no index for volume No. 133 (July-December, 1944) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below.

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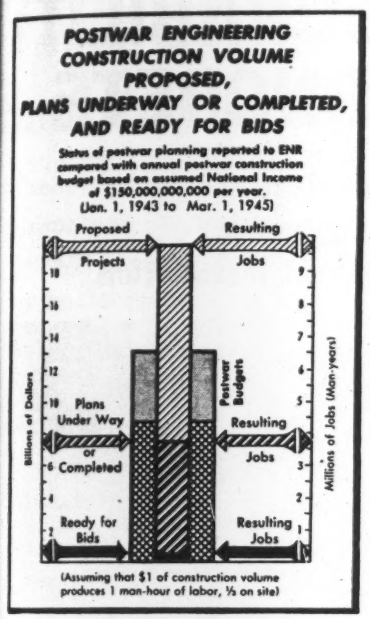
• Cover the Continent •

Postwar Planning Progress Report

IDENTIFIED AND RECORDED engineering projects proposed for construction in the postwar years total $19,084,829,000 for the 26 months from January 1943 through February 1945. Of this proposed total, engineers and architects,


POSTWAR ENGINEERING CONSTRUCTION VOLUME PROPOSED, PLANS UNDERWAY OR COMPLETED, AND READY FOR BIDS
Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year.
(Jan. 1, 1943 to Mar. 1, 1945)
Proposed Projects
Resulting Jobs
Plans Under Way or Completed
Ready for Bids
Postwar Budgets
Resulting Jobs
Resulting Jobs
Billions of Dollars
Millions of Jobs (Man-years)
(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

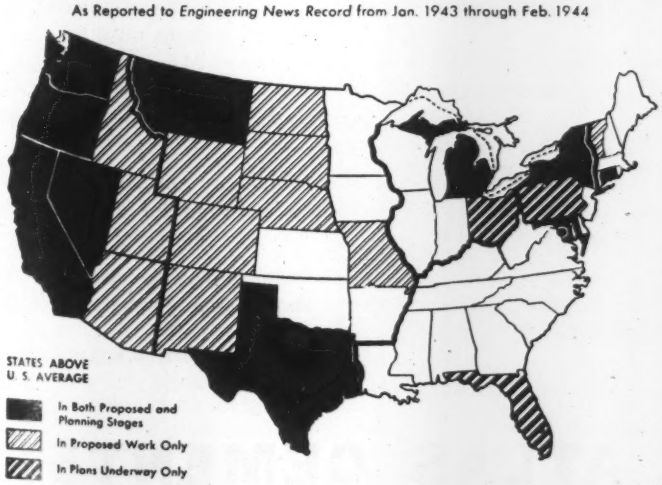
or both, are at work, or have completed plans for postwar projects worth $7,184,682,000. These overall totals in the proposed and planning stages, while a good start, do not provide as yet an adequate shelf of construction all ready to go. Only $618,716,000 worth of projects so far reported are ready-for-bids with plans completed, financing available, and all land and legal obstacles overcome. An additional $277,139,000 has plans completed, but no financing provided; and on another $360,977,000 the financing arrangements have been made, but the plans have not been completed.

Another weakness in postwar construction planning to date is the fact that the greater part of the planning to date is still confined to relatively few states. States with better-than-average records (per capita) in both proposed and planning stages are Connecticut, New York, Maryland, Michigan, Texas, Montana, Nevada, Washington, Oregon, California, and the District of Columbia. Three other states, Pennsylvania, Florida and Ohio exceed the U. S. average per capita volume in plans under way or completed.

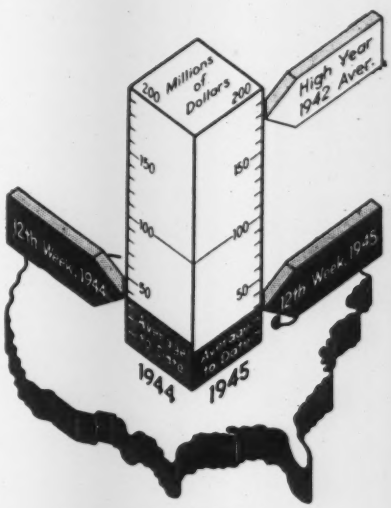
The good showing on proposed work, made by states west of the Mississippi and west of the Rockies, is due in large measure to Federal projects proposed. In North and South Dakota for example, federal work is 97 and 96 percent of all proposed public construction reported to date, Nebraska 78 percent, Kansas 88 percent, Montana 77 percent, Wyoming 97 percent, Colorado 88 percent, New Mexico 57 percent, Idaho 91 percent, Utah 68 percent, Arizona 97 percent, Washington 69 percent, and Oregon proposed postwar public construction 79 percent federal. Arkansas, North and South Dakota, Kansas, Wyoming, New Mexico, Idaho and Arizona lag as badly as the Southern states in projects in the planning stage.

HIGHEST RANKING STATES IN POSTWAR CONSTRUCTION PLANNING

As Reported to *Engineering News Record* from Jan. 1943 through Feb. 1944



CONSTRUCTION ACTIVITY



As Reported This Week to *Engineering News-Record*

CONTRACT VOLUME

Continental U. S. Only
(Thousands of Dollars)

	Week of Mar. 22 1945	Cumulative 1945 (12 wk.)	Cumulative 1944 (12 wk.)
Federal	$15,040	$199,089	$301,712
State & Municipal	3,181	34,540	30,908
Total Public	$18,221	$233,629	$332,620
Total Private	5,338	109,277	88,090
U. S. Total	**$23,559**	**$342,906**	**$420,710**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Type of Work	Dollar Volume (Thousands) This Week	Cumulative 1945 (12 wk.)	Cumulative 1944 (12 wk.)
Waterworks	$636	$8,463	$6,116
Sewerage	468	7,624	5,641
Bridges	573	7,491	2,053
Highways	1,644	15,471	23,591
Earthwork, Waterways	222	6,878	13,459
Buildings, Public	11,369	145,349	180,583
Industrial	3,621	78,825	35,736
Commercial	1,489	21,028	43,780
Unclassified	3,537	51,777	109,751

NOTE: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1945 (12 wk.)	Cumulative 1944 (12 wk.)
NON-FEDERAL	$167,894	$86,401
Corporate Securities	35,179	53,176
State and Municipal	118,915	27,450
RFC Loans	13,800	5,775
FEDERAL	$77,137	$90,832
Total Capital	**$245,031**	**$177,233**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	Mar. '45	304.50	146.37
Building Cost	Mar. '45	237.85	128.57
Volume	Feb. '45	78	34

CONCRETE HIGHWAY NEWS

Universal Atlas Cement Company (United States Steel Corporation Subsidiary)
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OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco

ILLINOIS TEST SHOWS DURABILITY OF AIR-ENTRAINING CONCRETE

NEW REFLECTOR CURB WINS PRAISE FROM PENNSYLVANIA

White Concrete Reflecting Curb has appreciably reduced the hazards of night driving, especially on rainy nights, on access roads to the Philadelphia Navy Yard, the Municipal Airport, and on Route 263, according to the Pennsylvania Department of Highways. The white concrete and the specially designed saw-tooth surface of White Concrete Reflecting Curb are the reasons.

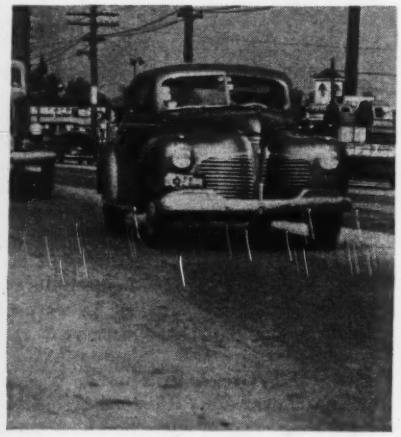
This safety curb increases driving safety because it greatly increases visibility of the road's edge—in the daytime, at night, and especially on rainy nights. The diagram below shows how and why it is such an efficient safeguard.

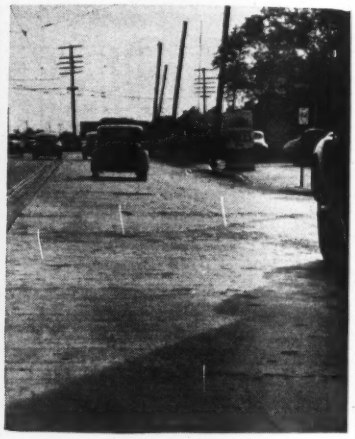
Write to Universal Atlas for a copy of the book, "A White Guide to Safety." It contains full information on the design and installation of white concrete reflecting curb.

A smooth curb (above) wastes the light from the driver's headlamps—reflects it up and away from the driver. A White Concrete Reflecting Curb (below) conserves this light—reflects it back to the driver. A smooth curb is barely visible at night; a White Concrete Reflecting Curb stands out bright and clear.

ENR-DC-7

Atlas Duraplastic* air-entraining cement used on test pavement installation





Test installations on South Archer Avenue, Chicago, laid in 1941. Left: eastbound lane placed with Atlas Duraplastic is practically scale-free. Right: westbound lane placed with normal portland cement shows scaling after identical salt de-icing treatment.

THE ILLINOIS DIVISION OF HIGHWAYS conducted an extensive investigation on the use of air-entraining portland cement on a busy sector of Archer Avenue, Chicago, a main artery to the Municipal Airport. Field and laboratory investigation of this installation shows that Atlas Duraplastic is highly resistant to the effects of freezing and thawing weather and to the scaling action of de-icing salts.

As a result of this study and of street, highway and airport installations elsewhere, air-entraining cement is now required for all state concrete highways in metropolitan Chicago.

Write to Universal Atlas for further information on the use of Duraplastic—the air-entraining portland cement that makes concrete more durable and more plastic.

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • MARCH 22, 1945 • VOLUME 134 • NUMBER 12

House committee considers building industry outlook

Encouragement of privately-financed projects more important than stimulation of public works, according to witnesses before special Congressional committee on postwar economic policy and planning

Although public works will constitute an important part of postwar construction activities, it is even more important to focus attention on measures that will encourage privately financed work if the construction industry is to realize its full potialities. This was the consensus of witnesses who appeared last week before the House subcommittee on public works and construction of the Special Committee on Postwar Economic Policy and Planning.

At the hearings, which were held in Washington, Harry A. Dick, Portland, Ore., contractor and president of The Associated General Contractors of America, stated that the nation has the need and the industry has the capacity to attain an annual volume of $12 billion in construction by the end of the first year after the war, and $20 billions annually five years later. If plans are permitted to develop through individual initiative, he said, privately financed construction will be so great that there will be little need to undertake public works for other than their normal utility or cultural value. Prosperous conditions in construction depend upon the prosperity of all industry, and therefore stronger efforts should be directed to attain a flourishing national economy rather than on thinking only of how public works could be stimulated.

The A.G.C. recommends said Mr. Dick, that the federal government establish as soon as possible its policy with respect to aiding states and local communities in the preparation of plans for their public works and with respect to aiding their construction. This lack of policy is causing an understandable and natural hesitancy on the part of local communities, he stated, since federal loans and grants have been available in the past. In response to a direct question, Mr. Dick said that there probably would be no need for federal aid for construction of public works during the first year after the war.

Chamber of Commerce viewpoint

Edward P. Palmer, of Senior & Palmer, contractors, chairman of the construction and civic development committee of the U. S. Chamber of Commerce, pointed out that public works accounts for only about one-third of the total volume of construction and consequently major reliance must be placed upon stimulation of privately financed work.

Mr. Palmer recommended, among other things, that: Sponsorship of various classes of public works by federal, state and local governments should be clarified. Recent stresses and pressures have blurred the division lines, which should be redrawn to establish the basic principle that the federal government will finance only those public works which lie within its jurisdiction or fields of direct responsibility. All other public works should be financed by state or local governments.

He also stated that private construction should be stimulated by revising tax policies to remove deterrents to expanding activity. Specifically, provision should be made for accelerated depreciation, deferred maintenance, postwar reserves for reconversion construction and planning, and liberalization of the provisions for averaging net operating losses over a period of years.

(*Continued on page 76*)

U. S. Signal Corps radiotelephoto, Press Assn.

Wreckage of the Ludendorff Bridge at Remagen

About 3 p. m. on March 17, ten days after its capture by American forces, the Ludendorff Bridge over the Rhine River at Remagen, Germany, collapsed, resulting in the loss of many engineers working on the bridge. Weakened by demolition charges and aerial attack, the bridge was out of service at the time while attempts were being made to repair it. For further details of the accident, see p. 71.

Used equipment sales in the Southwest slowed by confused procedure

Dealers bewildered by switches in selling methods and withdrawal of units in Oklahoma and Texas offerings. Floor prices regarded as too high and baffling to buyers

Failure of Treasury officials to establish a selling procedure and stick to it; a dearth of desirable items; holding to minimum prices, which in some cases were considered ridiculously high by the buyers present; removal of units from the sales line just prior to selling; and offering equipment to local governmental agencies while machinery-hungry dealers stood helplessly by, all marred a series of six sales of surplus used farm and construction equipment in Oklahoma and Texas during the past two weeks.

The sales, conducted by the Ft. Worth division of the Treasury procurement office, were at Tulsa and McAlester, Okla., and Denison, Austin, Bastrop and San Antonio, Texas. The confused conduct of the sales, disappointing to dealers who had come from points as far away as Milwaukee, Spokane and San Francisco, were in marked contrast to the fast, orderly and satisfactory selling procedure at Kearney, Nebr., a month ago, described in detail on vol. p. 393 of this issue.

At no time did the buyers in attendance question the good faith of the Treasury officials. The sales were conducted above board and in full compliance with the Surplus Property Act of 1944. It was the lack of organization, time-wasting haggling over prices of inconsequential items, and ignorance of the current value of the poor equipment that irked the prospective buyers. These were the first large sales conducted by the Ft. Worth office, and Martin L. Dowell, Jr., Treasury representative in charge, admitted he and his staff were feeling their way. Many of the practices complained of, he said, would be corrected in future sales.

Lists sent out in advance

A descriptive list of all items to be offered at each of the six sales was released well in advance of selling dates to dealers throughout the country. The equipment was briefly described and its condition noted. From these lists the dealers were supposed to determine whether they were interested in the offerings.

However, upon arriving at the sales lots the prospective buyers found the lists meant little. Items had been pulled off the line, sometimes only a few moments before they were to be sold, by the agency declaring them surplus in the first place, other units were grabbed off by municipal, county and state authorities prior to opening of the sale, and still other items not listed at all were added on the spot.

All equipment offered at McAlester was from Navy sources, much of it returned from Atlantic and Caribbean bases. Surplus army units from camps, posts and war plants in this country made up the stocks at the other five locations. In general, there was a lack of more desirable items, such tractors, bulldozers and shovels, and the counties grabbed off a big share of what was available. Scrapers were numerous, but failed to sell well because of high floor prices set by sales officials. All sales were f.o.b. cars at the lot.

Floor and ceiling prices set

Treasury officials had set both minimum and ceiling prices on every item. The top figure, supposedly 55 percent of new cost, was announced as each unit was offered, but the floor price was seldom divulged. Each price was offered first at ceiling price, and if there was more than one bid at that figure, the successful buyer was chosen by lot. Otherwise, bids were asked for, but the item was sold only if the high figure met the unannounced minimum price.

Just how the minimum prices were determined was not revealed, but at times it was evident that both ceiling and floor prices were in error. For example, a two-year old Iowa portable gravel plant, originally sold for $26,500, was offered at $17,000 floor price. Whoever set that figure didn't know that the primary crusher and all conveying units were missing, but a high bid of $5,000 was rejected. When the ceilings on a group of heavy steam pile hammers, McKiernan-Terry 10B3 and Vulcan Super No. 1 and No. 0 types, was found to be listed on the conductor's sheet from $59 to $129 each, the sale was stopped until a conference with hammerwise dealers established the original selling prices and new ceilings. The units went from $1,100 to $2,500.

Many items remained unsold because of bids considered unsatisfactory. The dealers couldn't see a minimum price of $4,000 for a 1926 Model 105 Northwest 1-yd. gas shovel, and a bid of $3,000 was rejected. A group of 16-ft. Koehring finishing machines, too short for modern paving work, was worth $356 each to one bidder, but he didn't get them in view of a $2,425 ceiling price. All but two of a score of Model 400 Gar Wood 15-yd. scrapers went begging at a floor price of $1,500.

Selling procedure varies

Not until the final sale, held at San Antonio, did selling get down to an established routine. Sometimes the sales conductor would go down a line offering each item at ceiling only, getting no bids because the buyers knew he would go back later and call for any-price bids. At other times selling was by the farm auction method, and confirming card bids were turned in by the successful buyer and two or three others if the high figure was accepted. At times, when cards bids failed to name a satisfactory figure, it was announced that the cards would be referred to the Ft. Worth office and perhaps the item might be released later to the high bidder. Thus, many bidders don't know as yet what they bought.

Finally, on the last day, selling got down to a routine that clicked. Each item was offered at ceiling price, and if not taken, then card bids were sought. If the resulting high bid was satisfactory, the figure and name of buyer were annuonced, if not, the item was passed and was not again considered. Selling under this plan picked up and moved faster than at any of the previous sales.

Floor prices continued to baffle the buyers, however. Just why a mixer was sold for $175 or 30 percent of the $575 ceiling, while a bid of $50 for a pump representing 52 percent of the ceiling of $97 was rejected, was not explained.

More equipment available

Mr. Dowell states there is a lot more similar equipment available in his territory that will be offered at sales in the near future. He intends, he says, to wait until large stocks can be prepared for sale, and that offerings to municipalities will be made in advance of making up the lists sent to dealers.

Just over three years after the first concrete work for the Norfork Dam across the North Fork of White River in Arkansas was started, the contractors, the Utah Construction Co., and the Morrison Knudsen Company, Inc., recently poured the last yard in the presence of representatives of the two companies and the U. S. Engineer office, which supervised construction of the dam containing approximately 1,500,000 cu. yd. of concrete.

All spans of Ludendorff Bridge lost by collapse into Rhine River

Weakened by demolition charges exploded by Germans on Mar. 7, the 512-ft. central span collapsed, hurling 200 engineers into river

Ten days after the U. S. First Army ized the 1200-ft. Ludendorff railroad ridge spanning the Rhine betweeen emagen and Erpel and thwarted the lazi's attempts to blow it up, the struc- re suddenly collapsed on March 17, rrying the Army engineers who were ying to repair it into the river.

The most satisfactory story of the tastrophe was contained in the report Gladwin Hill to *The New York imes*. The following account of the ccident is based on his report.

Bridge weakened

The collapse was said to be caused two of the demolition charges that e Germans managed to explode and y shelling and aerial bombing, but here was no bombardment on at the me the bridge fell. Neither was it rrying any traffic.

However, two engineer units, esti- ated at 200 men, were at work. One roup was assigned to the maintenance nd repair of the roadway so traffic ould cross, while a unit of specialists epaired the superstructure.

It was reported that the lower chord t the east end of the 512-ft. central rch span had been damaged by a erman demolition charge and that this ember broke suddenly near the spring- ng.

About two-thirds of the bridge swung ut laterally and, with no pier support, lumped slowly into the river, pulling the end sections of the bridge out of place with it. Piers and approaches were said to be intact. But a section leading from the center to the east bank went under water, whereas the section leading to the west bank fell partly on the bank and in shallow water.

Capt. Francis Goodwin of Buffalo, a construction supply officer, observed the catastrophe from the east bank.

"As I turned to look," he said, "the archway crumpled first and then the abutments dropped. It must have been 45 seconds before it finished gradually subsiding into the river."

Moments later, dozens of men bobbed to the surface downstream. They were swept by the current toward a pontoon bridge that engineers had thrown across the Rhine some distance north of the original crossing site ten days before.

Personnel on both banks threw ropes to the survivors and clambering out on the wreckage, much of which projected above the surface of the river, helped the injured men.

Details of the bridge

The Remagen bridge was built in 1916-18 to carry a double-track railway line. Its central span is a 512-ft. tied arch of a design used on other Rhine River crossings in which the outer ends of the approach spans are carried on short cantilever arms extending landward from the main arch piers. This explains why both side spans were lost when the main arch collapsed. The side spans were 278 ft. long.

One eyewitness account said that the outer ends of the approach spans went up in the air as the collapse began, which might indicate that the repair work in progress when failure occurred was on the arch ties in the bridge floor, which may have been damaged by aerial attack.

Study new building code for Milwaukee area

Widespread variations in building codes throughout Milwaukee County, Wis., have led to the formation of a new organization of building inspectors known as the Buildings Officials Association of Milwaukee County. Its purpose is twofold; to prepare a uniform building code subject to consideration and adoption by the 18 municipalities in that area, and to study and make recommendations from time to time as to new types of construction and newly developed building materials.

Although authorized by their respective governments to participate in drafting a universal code, members of the association are not empowered to act on the adoption of any code. That will be entirely in the hands of the municipal governing bodies. The proposed code will be all inclusive; covering construction, alteration and repair work on buildings in the various communities.

Officers of the new organization include Walter Connell, Wauwatosa, chairman; A. R. Lampe, town of Lake, vice chairman; John Briske, West Milwaukee, treasurer; and Gilbert Grunwald, architect in the county planning department, recording secretary.

Press Assn. Photo

Ludendorff double-track railway bridge over the Rhine River at Remagen, Germany, which collapsed during the afternoon of March 17, ten days after its capture. Failure of the arch dropped the outer ends of the side spans into the river.

Fay and Bove guilty of extortion from Delaware Aqueduct contractors

Union officials convicted of conspiracy and one count of extortion. Remanded to jail for sentencing April 5

Joseph S. Fay of Newark, N. J., vice-president of the International Operating Engineer's Union and James Bove of New York City, until very recently vice-president of the International Hod Carriers, Building and Common Laborers' Union, were found guilty in New York supreme court on March 15 of extortion and conspiracy to extort, on charges brought in connection with the construction of the Delaware Aqueduct, built for the New York Board of Water Supply.

Characterized by Justice Munson of the Court as "two of the most powerful union leaders in the United States, if not in the world," Fay and Bove were found guilty of conspiracy to extort a total of $703,000 from several of the 20 contractors working on the aqueduct, and specifically of extortion of $62,000 from Walsh Construction Co. Other contractors testified to payments of large sums (*ENR*, March 15, vol. p. 358) but their testimony was to the effect that money was asked to assure that their jobs "would run smoothly."

Neither of the accused testified. Several contractors and other construction men, presumably selected for having no direct personal knowledge of attempted extortion, were called by the defense as "character" witnesses.

No denial was made of receipt of the money that it was charged was paid to the accused.

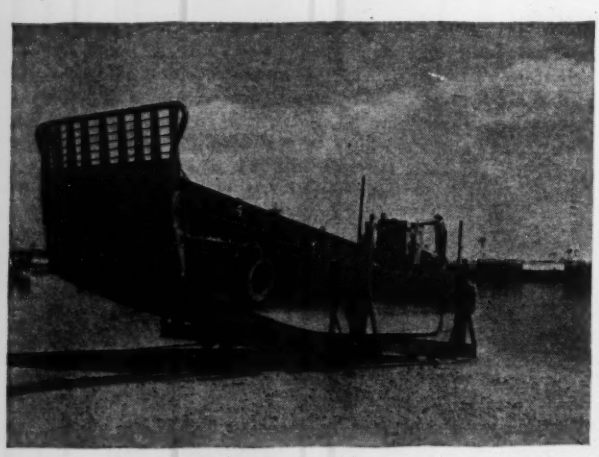
Bail for the two labor leaders was remitted and both were remanded to jail to wait sentence on April 5. Sentences may be as much as 18 years for each man. Meanwhile it is reported that the district attorney of Westchester County, New York, has announced that Bove will be called for trial April 16 on an indictment charging him with theft of $72,000 of the funds of Local 60 of the laborers union there when he was its head.

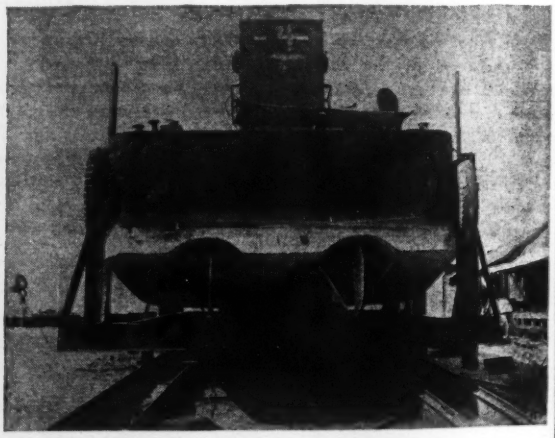
Advance work started on two California dams

Engineers of the U. S. Engineer Department at Sacramento, Calif., recently began a study of the Iron Canyon site of the proposed Table Moutain Dam on the Sacramento River, near the town of Red Bluff in northern California. About $425,000 will be spent on preliminary work at the Iron Canyon site by June, 1946. Funds for construction of the dam were authorized in the recent Flood Control Act.

Another northern California project on which the Army Engineers at Sacramento are doing preliminary work is the proposed Folsom Dam, on the American River, three miles above the town of Folsom. The estimated cost of this project is $18,474,000.

The Civil Aeronautic Administration has announced that it expects to complete within two months a survey of the site for a new $4,000,000 airport at Avoca, Pa., midway between Scranton and Wilkes-Barre. Charles B. Donaldson, CAA director of airports, says that upon completion of the survey, requests for bids will be issued by CAA's New York office and the contracts for grading and other work let.





Marine railway on Tarawa built with salvaged materials

A marine railway of unique construction has been placed in operation on Betio Island, Tarawa Atoll, by Navy Seabees to facilitate repair of LCM's, LCVP's and other small craft.

The railway, located on the bank of a small boat turning basin to move craft alongside the boat pool repair shops, was constructed from all salvaged materials with the exception of welding rods and pierced plank.

The pierced plank was used as a mat to protect the coral subgrade from the washing effect of the tide and to serve as a base for the tracks, which were placed on a vertical curve having a transition from a 2 percent grade to 12 percent.

Salvaged I-beams, laid parallel to the railway and spotwelded to the pierced plank were used in lieu of ties and provide strength and rigidity. To make the I-beams conform to the curve of the subgrade, cuts were made at 5-ft. intervals through the top flange and the webb. When the cuts opened, and the I-beams subsequently settled to grade, steel plates were welded to both sides of the web at the cuts.

The tracks are Jap rails, spot welded to the flange of the I-beams. Sections of the rails also are used as X-bracing between the two parallel I-beams carrying the track.

The carriage operated on the railway is all-welded construction, using various sizes of salvaged I-beams and structural steel. The wheels and axles were taken from a Japanese locomotive. A marine motor, mounted at the head of the incline, with power transmitted through a winch, has sufficiennt strength to to pull a 28-ton picket boat out of the water.

C. A. Frank, chief carpenter's mate, U. S. N. R., Napa, Calif., was in charge of the project.

Legal action taken to protect a water supply

The Metropolitan Water District of Southern California was made defendant in four injunction suits filed recently in Riverside County Superior Court by the San Jacinto River Protective Committee, which cited the asserted lowering of water levels in large areas of the county as its cause of action.

Plaintiffs are Nuevo Water Co., which serves the Nuevo district of Riverside County with irrigation and domestic water, and operators of ranches.

The action asserts that water levels in San Jacinto, Hemet and Perris valleys, east of the town of Riverside, have been adversely affected by the seepage of water from the San Jacinto River into the 13-mile San Jacinto tunnel of the Colorado River Aqueduct.

A writ of mandatory injunction to compel the Metropolitan Water District to restore 150,000 ac. ft. of water to the San Jacinto Mountain area is sought by the plaintiffs.

Consulting engineers study plans for Atlanta

Two Chicago firms of consulting engineers have been engaged by the Georgia State Highway Department to develop a system of interregional routes to serve the Atlanta, Ga., metropolitan area, according to a recent report. They also will study the coordination of proposed new highways in that region with existing state roads and city thoroughfares. The consultants for this work are Deleuw, Cather and Co. and H. W. Lochner and Co. W. Earle Andrews, consulting engineer of New York City, also will assist in the work.

Charles E. DeLeuw, senior member of DeLeuw, Mather and Co. was formerly chief engineer of the Department of Subways and Superhighways, Chicago. Mr. Lochner formerly served as assistant superintendent of the Cook County, Ill., highway department. Both men participated in the preparation of Chicago's plans for the construction of a network of superhighways.

La Grande power plant in operation this month

Operation of the enlarged La Grande power plant on the $23,000,000 second Nisqually power project for Tacoma, Wash., is expected to begin during the last week of March, according to Tacoma Utilities Commissioner C. A. Erdahl.

The 7-mile basin behind the recently completed Alder Dam on Nisqually River has been full since Feb. 8, while the new 40,000-kw. unit in the La Grande plant has been ready since Dec. 13. Only clean-up work remains in the 6,500-ft. tunnel from La Grande Dam to the powerhouse, Mr. Erdahl said, after receiving reports from Chief Engineer J. V. Gongwer.

The old La Grande plant was shut down October of last year to allow the closing of Alder Dam, which is located about 1½ miles upstream from La Grande Dam. The first concrete for both new dams was poured in the fall of 1942.

Rhine crossed by Caesar 2,000 yr. ago

It was almost exactly 2,000 years before the Americans captured the Ludendorff Bridge and likewise spanned the Rhine with pontoons that Caius Julius Caesar built his famous timber bridge across the stream in his campaign against the German barbarians of that day.

The exact site of Caesar's bridge of 20 centuries ago is not known. Some authorities think it was somewhere between the present cities of Wesel and Duesseldorff; others just north of where the Moselle enters the Rhine.

However, there is no doubt that he did build the bridge and that it proved just as tactically advantageous to the Roman legions as it is hoped that the latest eastward crossings will be for the Allied cause now.

Caesar's account

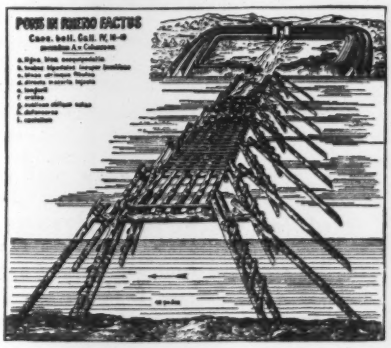
Caesar's own "third person" account of his bridging of the Rhine long before the Christian era is contained in the 17th chapter of Book IV. of Caesar's "De Bello Gallico." Following is a translation from the Latin made by W. A. Macdevitt and published by J. M. Dent & Sons, Ltd., London, and E. P. Dutton & Co., New York:

"Caesar had resolved to cross the Rhine; but to cross by ships he neither deemed to be sufficiently safe, nor considered consistent with his own dignity or that of the Roman people.

"Therefore, although the greatest difficulty in forming a bridge was presented to him, on account of the breath, rapidity, and depth of the river, he nevertheless considered that it ought to be attempted by him, or that his army ought not otherwise to be led over.

"He devised this plan of a bridge. He joined together at the distance of 2 ft., two piles, each a foot and a half thick, sharpened a little at the lower end, and proportioned in length to the depth of the river.

"After he had by means of engines, sunk these into the river, and fixed them at the bottom, and then driven them in with rammers, not quite perpendicularly, like a stake, but bending forward and sloping, so as to incline in the direction of the current of the river; he also placed two other piles opposite



these, at the distance of 40 ft. lower down, fastened together in the same manner, but directed against the force and current of the river.

"Both these, moreover, were kept firmly apart by beams 2-ft. thick (the space which the binding of the piles occupied), laid in at their extremities between two braces on each side; and in consequence of these being in different directions, and fastened on sides the one opposite to the other, so great was the strength of the work, and such the arrangement of the materials, that in proporition as the greater body of water dashed against the bridge, so much the closer were its parts held fastened together.

"These beams were bound together by timber laid over them in the direction of the length of the bridge, and were then covered over with laths and hurdles; and in addition to this, piles were driven into the water obliquely, at the lower side of the bridge, and these serving as buttresses, and being connected with every portion of the work, sustained the force of the stream: and there were others also above the bridge, at a moderate distance; that if trunks of trees or vessels were floated down the river by the barbarians for the purpose of destroying the work, the violence of such things might be diminished by these defences, and they might not injure the bridge.

"Within ten days after the timber began to be collected, the whole work was completed, and the whole army led over."

Army discontinues the Canol Project because it is no longer needed

But $133,000,000 pipelines and refinery will be kept in condition to resume operation. Canada has option to buy

As reported last week (*ENR*, Mar. 15, vol. p. 356), the major portion of the Canol project in northwest Canada will cease operation not later than June 30 and possibly at an earlier date.

The War Department says that the only facilities to remain in service are the distribution pipelines. These consist of a 110-mi. line of 4-in. diameter connecting Whitehorse and Skayway, Alaska; on the coast; a 3-in. diameter pipeline 587 mi. in length extending northward along the Alaskan Highway from Whitehorse to Fairbanks, Alaska, and a 2-in. line running southeastward along the highway for 266 mi. to Watson Lake. These will remain in service for some time, as they will be needed to serve airports with petroleum products delivered by tanker at Skagway.

Decision to shut down the Canol Project is based on the anticipated improvement of the tanker situation, and the greatly improved military position of the area supplied by the refinery. Moreover, because of the severe climatic conditions and the remote area in which the facilities are located, operation has been expensive.

Why Canol was built

Construction was begun in 1942 when Alaska was gravely threatened by the Japanese and when American tankers were being sunk in large numbers. Records of the Chief of Engineers, U. S. Army, reveal that the total development cost was $133,111,000. Of this amount approximately $13,000,000 was spent on exploration and development of the crude oil supply at Norman Wells near the Arctic Circle, about $61,000,000 for construction of the 577-mi. crude oil pipeline leading from the well field to the refinery, nearly $27,000,000 for the refining facilities, and most of the remainder for the distribution pipelines.

Facilities in "caretaker's" status

As they are shut down, the oil pipeline and the refining facilities are placed in a "caretakers" status so that operation could be resumed readily. Such a plan will permit the release of most of the operating personnel, employed primarily by private organizations under cost-plus-fixed-fee contracts, freeing about 800 American civilians for war work in the United States. Included in this group are nearly 200 refinery technicians badly needed for similar work in this country.

International agreement

In the negotiations with Canada before construction was begun, it was agreed that the crude oil pipeline and refinery would be appraised at the end of the war by appraisers appointed by the United States and Canada, and that the latter country would have an option to purchase that part of the property at the appraisal price. In case Canada should not want to exercise the option the property could be sold to any other bidder at not less than the appraised value. If no acceptable offers are received, disposition is in the hands of the Permanent Joint Board on Defense of the United States and Canada. According to diplomatic notes recently exchanged, the appraisal is expected to be made within a reasonable time, perhaps before the termination of the war.

U. S. option to buy oil

The oilfield, however, will remain the property of the operator of the field, Imperial Oil Limited, a subsidiary of Standard Oil Co. of New Jersey. The United States government retains the right to purchase up to 60,000,000 bbl. of oil at cost of production plus 20 cents (Canadian) per bbl., from which will be retained 5 cents per bbl. for repayment to the United States of an amount up to $3,000,000 for materials and facilities turned over to Imperial.

A view that the project may have a much greater value than might at first appear probable is based upon the belief that much postwar air traffic will move over the Canol area and that the facilities have more than sufficient capacity to supply predictable requirements of petroleum products there.

The very busy little fellow with all the tools is a Walt Disney creation designed for the Corps of Engineers' maintenance personnel and for use of The Maintenance Engineer, official publication of the Army Engineer groups who keep the machines of war running.

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Senate votes more funds for local planning

Late last week the Senate passed the $3.1 billion Independent Offices Appropriations bill (H. R. 1984), which passed the House Feb. 8. As predicted earlier in the month (*ENR* March 1, vol. p. 297) the Senate increased the aid to local communities for postwar public works planning from $5,000,000 to $35,000,000. Also included in the bill as approved is an amendment providing that veterans applying for federal loans to build homes will have priority over all civilian users of construction materials except for military needs.

A suggested amendment providing that no funds for postwar planning would be available to the states until state legislation designated an over-all state agency to use such funds was defeated, as was a proposed amendment requiring the local planning agencies to match any federal aid on a fifty-fifty basis.

It was officially stated in the discussion of the bill before its passage that the approval funds for planning did not obligate the federal government to supply money for construction at some later date. The bill now awaits further action before the House-Senate Conference Committee.

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Over a billion dollars Navy construction work

Included in the President's request of $25.2 billion for the Navy Department for the fiscal year 1946 is nearly $1.6 billion for public works construction by the Bureau of Yards and Docks. Also requested is $165,350,000 for maintenance work by the bureau.

Hearings on the President's request are now being held before the House Appropriations Committee. A bill requesting the amount recommended by this committee is not expected to be introduced for some time.

China sending 1,200 engineers and technicians here for special training

To receive a year of intensive instruction and experience as part of lend-lease aid—American engineers being sent to China

During the next few months 1,200 ngineers and technicians employed by e national government of China may brought to this country to receive tensive engineering and industrial aining. Sponsored by the Foreign conomic Administration, the program aimed primarily at greater war effort the part of China and at placing at country in a better position for ostwar industrialization.

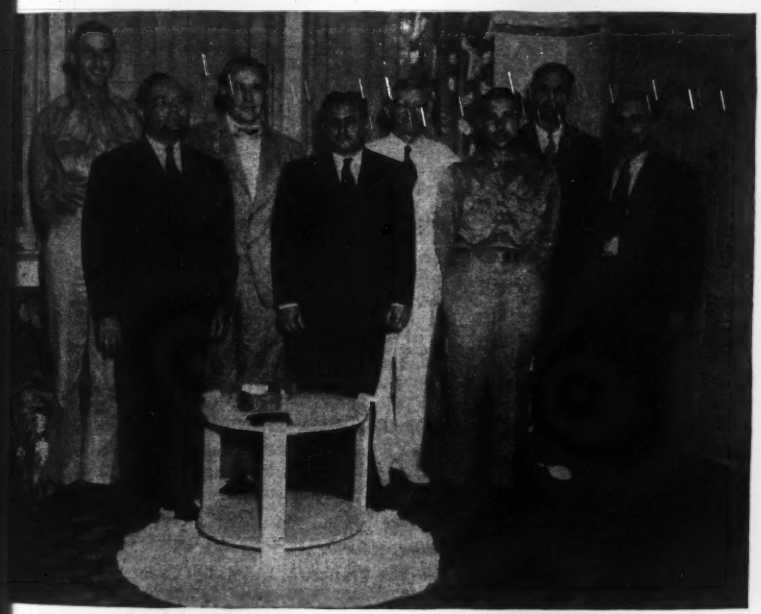
Expected soon are about 20 hydraulic ngineers, more than 50 electric power ngineers, 5 men trained in sanitary ngineering, over 125 railway men, early 100 highway engineers, and about 10 irrigation engineers. Most of the men will be college graduates. They are to supplement 110 railroad engineers already in this country under the auspices of the U. S. Office of Defense Transportation, who are taking special training in the science of railroading as carried on in this country.

Flown out of China by the route leading "over the Hump," the men are to travel from India to this country by ship. One group consisting of 36 railroad workers and 33 miscellaneous workers has already arrived. These men landed on the West Coast late last month and started their training immediately under the direction of the International Training Administration, Inc., a non-profit corporation of which E. S. Hanson, formerly of the U. S. Steel Corporation, is president.

This organization placed the men with government agencies, industry and private organizations. It is calling on the American Society of Civil Engineers, the American Road Builders Association, and other engineering groups for aid in finding placement for the men yet to arrive. Some of the men will spend only about six months in this country, while other groups will be given a year of training.

While being trained, the men receive a salary paid as part of the lend-lease aid from this country to China. In addition, some of the men will receive allowances to take care of equipment or tools that their work may require. The FEA estimates that the training program will cost about $3,000,000.

As a further aid to China the FEA is sending American engineers to China to work on war projects in that country. During the last several months, approximately 25 American engineers and specialists have been sent to China to aid in transportation, industrial operations, and other phases of China's war program. They will stay several months helping China establish her own war production board. These men are employed under the auspices of the Foreign Economic Administration and the U. S. State Department. Twenty additional men, of which about one-third will be professional engineers, are expected to leave in the next few months.



Sanitary engineering group for Caribbean area

A new sanitary engineering organization own as the Caribbean Water Works Asso- ation was formed in San Juan, Puerto Rico, st month.

Dedicated to the advancement of knowl- ge of the design, construction, operation d management of waterworks, with par- ular reference to the tropics of the West- Hemisphere, this association will be made of members from all the islands in the ribbean area, including Haiti, Santo Do- go, and the British, French and Dutch ssessions in the West Indies.

The "steering committee" of the associa- tion, pictured above, includes the following: Rear row, left to right: Senior Assistant Sanitary Engineer Vernon B. Hammer; Consulting Engineer Malcolm Pirnie; Consulting Engineer R. A. Gonzalez (Mr. Pirnie's representative in Puerto Rico); Sanitary Engineer G. Diago, Bureau of Sanitary Engineering, Insular Health Department. Front row, left to right: A. Hernandez, hydraulic engineer, Insular Aqueduct Service; F. Ramirez, professor of chemistry, College of Agriculture and Mechanic Arts, and water plant operator at Mayaguez, P. R.; Sanitary Engineer E. J. Herringer and M. Seoane, mayor of Caguas.

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Commissions to decide Kan.-Colo. water dispute

Having been empowered by the Kansas state legislature, Governor Andrew Schoeppel of that state has appointed a commission to negotiate with Colorado for a water compact to settle a 40-year-old controversy between those states regarding Arkansas River water rights.

Governor Schoeppel has chosen as commissioners Roland Tate and W. E. Leavitt of Gardner City. In addition, George Knapp, chief engineer of the Kansas Water Resource Division, and Attorney General A. B. Mitchell are statutary members of the commission. The first meeting probably will be held at an early date.

Colorado has already appointed a commission, and compact authorization legislation has been introduced in Congress. In a U. S. Supreme Court decision last year the two states were directed to settle their long-standing argument by agreement.

Construction outlook

(*Continued from page 69*)

The most effective method of assuring that the actual construction needs of the country will be met with reasonable continuity of construction operations is to provide an adequate flow of private and public investment funds, according to Thomas S. Holden, president of the F. W. Dodge Corporation.

Calling for action on two fronts—overall postwar tax policy and postwar federal fiscal policy — Mr. Holden pointed out that the preservation of our governmental system depended on the solvency and autonomy of local communities. To do this by reviving as a permanent policy the depression emergency system of federal doles would be to court great political and financial dangers.

He also urged a broad study of existing lending, mortgage insuring and other fiscal agencies of the federal government in relation to the long-term credit needs of the postwar economy. Such a study should include consideration of the need for some kind of capital credit or banking facility for state and local governments. However, said Mr. Holden, we are not faced with any emergency requiring hasty action on the basis of immature consideration.

Manpower shortages, particularly in skilled building labor, will be one of the bottlenecks to construction revival in the first twelve months after military cutbacks are made, continued Mr. Holden. The others will be government controls, price problems, and material supply problems. "Even the materials for such heavy construction as highways may be difficult to procure in adequate amounts, not in their case on account of shortages but by reason of transportation difficulties. These will be the problems of the early transition period; there will be neither lack of demand, nor lack of purchasing power. In view of pressing private building, engineering and deferred maintenance demand, and of the serious but temporary limitations on actual construction in the early postwar months, it can be readily seen that overstimulation of public works at that time would intensify competition with necessary private construction for manpower and materials and greatly strengthen the inflation threat."

Is the industry prepared?

Questioning the probability of the industry being able to mobilize materials and manpower fast enough to undertake the $16 billion annual program of construction that the economists have proposed for the early postwar period, Edward J. Cleary, managing editor of *Engineering News-Record*, stated that our immediate concern should not be related solely to the creation of a backlog of planned projects. Rather, said he, we are challenged to determine how fast the resources of the industry can be expanded to handle the volume of work that will be ready for execution.

Mr. Cleary pointed out that at no time in its history has the construction industry been able in one year to expand its annual rate of productivity by more than 62 percent. Analyzing the rate of increase in terms of postwar construction, he reached the conclusion that probably the best performance that could be hoped for a year hence—if all restrictions on manpower, materials and equipment were removed today—would be 62 percent of the present low volume of $3.3 billions, or $5.3 billion. Not until three years have elapsed would the industry be ready to operate above an annual rate of $14 billion.

This view, that the rate of increase will govern the amount of construction that can be put underway in the postwar period, was emphasized in testimony given by M. H. Hedges, director of research, International Brotherhood of Electrical Workers. Mr. Hedges stated that lack of materials could easily be the "bottleneck" to expanded construction volume.

Miles L. Colean, author of a National Planning Association report on stabilizing the construction industry, and Beardsley Ruml, treasurer of R. H. Macy Co., who recently proposed that the construction industry be federally regulated on the basis of a quasi-utility service, outlined broad policies that might aid in preventing violent booms and depressions in the construction cycle.

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Chicago firm pays for cleaning city sewer

Chicago recently established a precedent for forcing industrial firms to maintain proper sewage flow from their plants when it collected $173 from the Western Shade Cloth Co. for work performed by the bureau of sewers.

The company was informed by Thomas D. Garry, superintendent of sewers, that his department was forced to flush and clean the main city sewer because an oily discharge from the plant entered the sewers to cause stoppages.

JOBS OF THE WEEK

HOSPITAL, Honolulu, Hawaii.

U. S. Engineers, Honolulu has awarded an architect-engineer-management contract to York & Sawyer, New York, N. Y., on the Tripler Hospital, there to serve as base hospital for Central Pacific area. The estimated cost is $16,000,000. The main building will be 10 stories high, with 2 wings 5 stories and 2 wings 4 stories, with reinforced concrete frame designed to withstand earthquakes.

AIRCRAFT PRESERVATION HANGARS, Alameda, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing aircraft preservation hangars, and transit sheds at Naval Air Station to James I. Barnes Construction Co., San Francisco, Calif., at $1,453,000.

STORAGE FACILITIES, Hawthorne, Nev.

J. A. Terteling & Sons, Inc., San Francisco, Calif., has been awarded a contract for constructing 40 inert storehouses, 30 fuse and detonator magazines, 75 earth-covered ammunition storage magazines and one steel gravity water tank and towers, roads, railroads and services, by Bureau of Yards & Docks, Navy Department, Washington, D. C., at $3,868,196. Blanchard & Maher, San Francisco, are the architects.

PROCESSING FACTORY, Tracy, Calif.

W. A. Bechtel Co., San Francisco, Calif., has been awarded a contract for 2 and 3-story, 300x800-ft. food processing factory by J. Heinz Co., Berkeley, Calif. The estimated cost is $1,500,000.

PLANT, Portland, Me.

Defense Plant Corp., Washington, D. C., awarded a contract for repairing and renovating bomb shell casing plant at Thompson Point to P. A. Cunningham & Co., Bangor, Me. The estimated cost is $800,000.

HOSPITAL ADDITIONS, Murfreesboro, Tenn.

U. S. Veterans Administration, awarded contract for additional buildings at Veterans Hospital to Virginia Engineering Co., Newport News, at $1,531,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 175.

OBITUARY

John S. Laughlin, 57, who was consulting engineer to the Borough of Queens, New York City, from 1939 to 1942, died at Seneca Falls, N. Y., on March 12. He was graduated from Manhattan College in 1907, following which he did engineering work for the Pennsylvania Railroad. Later he was an engineer on a Quebec bridge and was engaged on Great Lakes construction jobs. After 1942 Mr. Laughlin worked in Cuba for the U. S. Government. He had been connected with Smith-Hinchman & Grylls, Inc., New York architects and engineers, since last July, and was working for them on a Navy contract when he died.

Ferd Bonstedt, 80, reported to be the first engineer for the U. S. Bureau of Reclamation on the Okanogan, Wash., irrigation project, died March 5 in Okanogan.

Leonard Tanner, 64, Salt Lake City, Utah, engineering department hydrographer, died March 3 in that city. A graduate of the University of Utah, Mr. Tanner served the U. S. Geological Survey from 1913 to 1919 as water commissioner on the Muddy River, Nev., and Snake River, Idaho.

J. T. Williams, 48, president of the Southeastern Building Co., who built Napier Field and the Mobile municipal airport, died in Dotham, Ala., March 7.

Col. W. R. Winslow, a West Point graduate, who formerly was stationed with the U. S. Engineers at Pittsburgh, Pa., died on Feb. 24, while serving with the Ninth Army in Europe.

Stanley G. Proverbs, 59, a civil engineer connected for many years with the Metropolitan District sewerage division at Boston, Mass., died recently.

Henry J. Kesner, 62, professor of civil engineering at the University of Nebraska, died in Lincoln recently. A Canadian by birth, he recevied his civil engineering degree from the University of Colorado. His particular interest was in structural engineering. He taught successively at the University of Minnesota, University of California, Purdue University, Armour Institute of Technology, and at the University of Nebraska from 1923 to the date of his death. He was responsible for the design of many bridges in Indiana, Colorado and Illinois.

G. T. Horton, 71, dies; head Chicago Bridge Co.

George Terry Horton, president, and manager of the Chicago Bridge and Iron Co., died in Chicago on Mar. 19 at the age of 71.

Graduated from Rensselaer Polytechnic Institute in 1893 as a civil engineer, Mr. Horton went to work for the Chicago Bridge and Iron Co. When his father, Horace E. Horton, who operated the company with several associates from 1889 to 1897 and as sole proprietor after 1897, died in 1912, George T. Horton became president. He participated in the development of elevated steel tanks. The Hortonsphere, used for the storage of liquids and gases, was named after him. He was also active in the application of welding to steel tanks and was president of the American Welding Society in 1939-1940. At least 44 patents have been issued in his name.

Mr. Horton maintained an active interest in the affairs of Rensselaer, serving as an alumni trustee from 1925 to 1928 and as a life trustee since 1929. He donated four scholarships.

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Funds asked to plan Missouri River project

The President Tuesday asked Congress to appropriate $4,480,000 to the Department of the Interior for the preparation of plans for development in the Missouri River valley.

In submitting the request the President wrote: "This estimate includes funds only for the work preliminary to actual construction of projects and must be performed irrespective of whether construction of the projects in the basin is accomplished by a Valley authority or other agencies. In my judgment, the proposed work will not interfere with the conduct of the war."

The funds requested will permit the Interior Department to prepare detailed plans and specifications for certain of the initial works authorized by the Flood Control Act and to continue the investigations for working out the general plan approved by it.

Provision is being made in the War Department Civil Appropriation Act to enable the Corps of Engineers to undertake the work of preparing detailed plans and specifications for its share of the project authorized by the 1944 Flood Control Act. This act, authorizing the construction of the Pick Plan of the Army Engineers and the Sloan Plan of the Bureau of Reclamation, as coordinated by the two agencies, was approved by the President on Dec. 22, 1944. At that time, he stated, "My approval of this bill is given with the distinct understanding that it is not to be interpreted as jeopardizing in any way the creation of a Missouri Valley Authority, the establishment of which should receive the early consideration of the next Congress."

Hearings on the Missouri Valley Authority bill now before the Senate will begin April 16.

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Flood situation serious on Arkansas rivers

The flood situation in Arkansas is becoming serious, with continued heavy rainfall in the north and west section of the state starting Arkansas and White rivers on new rises.

Lakes Hamilton and Catherine on the Ouachita River near Hot Springs rose 6 ft. March 19, and all flood gates of both dams have been opened. With flood water from the upper Ouachita due to flow into both lakes, it is expected they will become dangerously high.

White River, swollen by heavy rains in the upper basin, reached a stage of 24.4 ft. at Batesville at 7 p. m. March 19, and was rising at the rate of two-tenths of a foot an hour. A stage of 26 ft. was expected at Batesville March 21.

Arkansas River reached 27.14 ft. at Fort Smith on March 19—5 ft. above the flood stage.

Missouri Pacific Railroad Co. engineers and construction crews are battling to save the roadbed near Conway, where the Arkansas River is threatening to wash it out. A new roadbed is being constructed with crews working on a 24-hr. basis.

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Army will maintain Alaska Highway

Despite a prediction last week in the United States Senate that the U. S. Army would suspend maintenance of the Alaska Highway, the office of the Secretary of War Stimson reports that maintenance can be expected to continue as in recent months. It is pointed out that our agreement with Canada requires that maintenance shall not end for at least one year after the war ends. A new agreement in regard to the highway, of course, could be reached, but to date this has not been done.

Among the troops still on the job are the engineer fire fighting units and the ordnance heavy shop units.

The Week In Engineering and Construction

(*Continued on page* 118)

EDITORIALS

VOLUME 134 NUMBER 12

March 22, 1945

Bridging the Rhine

As THIS IS WRITTEN, information as to what happened to the Ludendorff Bridge at Remagen is fragmentary and conflicting. Possibly the bridge was more seriously damaged by the charges the Germans did succeed in setting off than was first apparent. Being a tied arch, it also is possible that the ties, which were below the bridge floor, were seriously injured by the aerial attacks made on the bridge after its capture, resulting in the failure of the main span while engineers were trying valiantly to repair or replace the ties. Such an event would explain the relatively slow start of the collapse, reported by some observers, which collapse carried many engineers working on the bridge to their death. Whatever the cause of the collapse, we have this knowledge; the ten days between the time the bridge was captured and its collapse gave other engineers time to build at least one pontoon bridge, and possibly others, that could not have been built across the Rhine without a much greater loss of life had the enemy been holding the opposite shore.

Bypassing the "Sheepskin"

MUCH CAUSE FOR SPECULATION will be found in the plan of the Missouri School of Mines to include a course in construction contracting in a group of two-year courses designed to help returning soldiers in their readjustment to civil life. The subjects that are to be taught will be a first cause for comment by those who have given thought to training courses for men planning to go into contracting. It is difficult to understand why such subjects as advanced surveying and photogrammetry are included while labor relations and personnel management are excluded, especially as the courses are characterized an end-courses at a subprofessional level. But the more significant question raised by this type of training program is its effect on our present system of engineering training. These men are to be taught "at college level" algebra, trigonometry, plane and advanced surveying, analytical geometry, physics, mechanics, structural desi soil mechanics, foundations and engineering e nomics. Upon completion of the course they sho be able to pass the educational part of license aminations of most if not all states. As a practi matter, therefore, they will stand on a par w graduates from four-year engineering courses. that a desirable condition? Will inclusion of much engineering in a subprofessional course work to the disadvantage of men willing to spe time and money on building a broader base for engineering career?

Concrete Floating Drydocks

UNDER DIRECTION of Vice-Admiral Ben Moreell, concrete technician of note, the Bureau of Yar and Docks has made an unqualified success of u of concrete for a part of the great fleet of floati drydocks built for the Navy. Unlike the concre ships built during the current war, the drydoc were designed and constructed by men who belie firmly in concrete as a material suitable for t work and who know concrete well enough to utili its inherent advantages. For instance, beam an wall sections are adequate to permit placing bo reinforcing and concrete readily. The extra weigh so detrimental to ship operation, merely requires little greater draft for the dryock and results in more stable structure. Designs and methods of co struction, as described in this issue, have proven s satisfactory that they point the way to use of co crete if more floating drydocks or large floati vessels, other than ships, are needed as our wa effort in the Pacific is intensified.

Expansion Joints

MUCH HAS BEEN LEARNED about expansion in rail road track and highway pavements in recent year as the result of bold departures from traditiona practices. Early experience with both track an rigid pavements indicated the need for open joint that would permit rails or pavement slabs to expan and contract. "Sun kinks" were a common caus of derailments in the early days of railroad opera tion, whole sections of track being suddenly pushed right out of the light ballast of those days, the movement frequently occurring just ahead of o under a train. Similarly, sections of light concrete pavement were raised vertically by the push of ex pansion, or the ends of slabs were sheared off and shoved up onto the adjoining slab. The outcome, both on railways and highways, was an elaborate

m of sliding joints, which joints always have a source of expense and trouble.

hen came the decision of a few railroad engi- s to eliminate most rail joints by welding long ches of rail into a single unit, letting the expan- forces be absorbed by increases in internal ses. Heavier rail sections, rail anchors and ier ballast made sun-kinks improbable. The lts exceeded all expectations. Movements at nd of half-mile stretches of rail were little more those of a 33-ft. rail.

ore recently, the same kind of thinking has been ied to highway pavements. Two large-scale riments in Oregon are reported in this issue. n the case of rails, long stretches of concrete show no abnormal movement at the ends. Be- e concrete lacks tensile strength, dummy con- ion joints were inserted at short intervals to entrate cracking at predetermined points.

he rail experiments already have paid large lends. Equally large returns are expected the highway studies. Both stand out as fine nples of the advantages to be gained by bold rtures from accepted practice when these de- ures are based on the sound application of neering principles.

s of Used Surplus Equipment

HE CRITICAL ANALYSIS of the Surplus Property of 1944, published in this journal two weeks F. Salditt of the Harnischfeger Corporation ted to several inconsistencies and weaknesses in ct. Because of these shortcomings, provisions e act are subject to wide interpretation by the d set up to administer the act. Just how these rpretations are made, Mr. Salditt pointed out, determine whether the disposal of surplus prop- will disrupt or benefit the business economy. is why he pleads for industry advisory com- es to work with the board, a procedure that ld be established.

ars that government sales of used surplus con- tion machinery will disrupt the equipment stry or put counties and cities into the construc- business found little support in what transpired ecent large sales conducted by the Treasury. e first place, most of the equipment now being ed is junk, or little better. Everything worth iring is being repaired for military service, so no first-class equipment will be available for some time. Secondly, municipal and county authorities are indicating interest in only a few replacement units, or enough for bare maintenance purposes.

The Treasury Department has now had enough experience in big sales of used construction equipment to establish a uniform and satisfactory procedure. Both good and poor selling practices were revealed at recent sales, which are described in this issue. Out of these experiences can be outlined a procedure that should be fair to the government, the taxpayers and the buyers.

The first requisite is to have something to sell, with a sufficient quantity of items to attract a large group of buyers. Tractors, bulldozers, scrapers, graders, shovels and cranes are in great demand right now, and every sale should include some such items. Once the buyers are attracted to the scene, they will also be interested in the less desirable units. Next in importance, to keep faith with the dealers attending the sales, is to include in the sale everything included in the lists furnished. This means that to meet the Surplus Property Act's provision of preference to local government agencies, surplus equipment would have to be offered in advance to such agencies. Then, from what is left, lists should be prepared for distribution to dealers. Further, no government agency originally declaring certain equipment surplus should be permitted to pull that equipment off the line at the last moment, as the Navy did at McAlester recently.

Also, if Treasury officials really want to sell the equipment now being offered, they should let it go at the prices established by a group of competitive bidding dealers, and not hold out for a hypothetical floor price set by some clerk unfamiliar with equipment trends and obsolescence. Just as soon as better or new equipment becomes available, most of the items now being offered will have no value other than as scrap iron. The Treasury needs to recognize that fact in setting prices on the old and obsolete material now being offered for sale.

Lastly, farm and construction equipment should not be offered at the same sale, as these two classes are bought, in general, by different dealers.

Handled on a sane, practical and fair basis, disposal of surplus used construction machinery will get needed units into the hands of the users with the least effect on equipment dealers and without disturbing the economy of the construction industry.

INEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* **Copyright, 1945, by McGraw-Hill Publishing Company, Inc.**
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Engineers Convert Wrecked Airfield Into Huge Transport Plane Base

Waldo G. Bowman
Editor, Engineering News-Record
(By air mail from the European Theater of Operations)

***Contents in Brief**—Like Hercules' task in the Augean stables with respect to difficulty and magnitude are the duties of an Engineer aviation battalion in France, as described in Mr. Bowman's latest story of what he saw along the invasion route. Handicapped by mud, the Engineers patched and rebuilt runways, filled bomb craters, constructed taxiways, hauled rubble, built parking areas, erected hangars and demolished partly wrecked structures—at the same time keeping the field in operation.*

CONTINUALLY ATTACKED by Allied bombers when the Germans were its tenants and devastated further by the Germans themselves when they had to abandon it, a French airfield has been put back into service for our C-47 and C-54 transport planes by an Engineer aviation battalion, aided by a small maintenance unit of Navy Seabees. These American military construction experts, with two years of experience in building bomber fields in England under their belts, have struggled since last August to keep ahead of the operational demands of the U. S. Air Transport Command.

Now that repairs and temporary facilities have made the field fairly efficient, attention is being directed toward some of the more permanent improvements that we will need soo Indeed, this field, which now cove 2,300 acres and could readily be e larged, may well be one of the gre airports on the international airlin net in the postwar years.

Inasmuch as the field, which date from the last war, and, in fact, ha been used by the American air force then, was an active German base, i facilities were prime targets for o bombers. And since these facilit were extensive, the clean-up and r building job that ensued was a maj one. Of over a hundred buildings o the field, two-thirds were complete destroyed, and all but about a doz of the remainder were damaged.

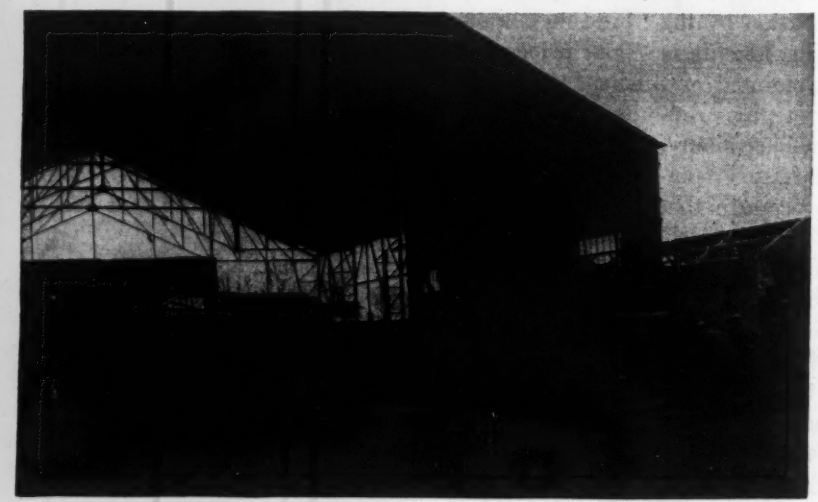
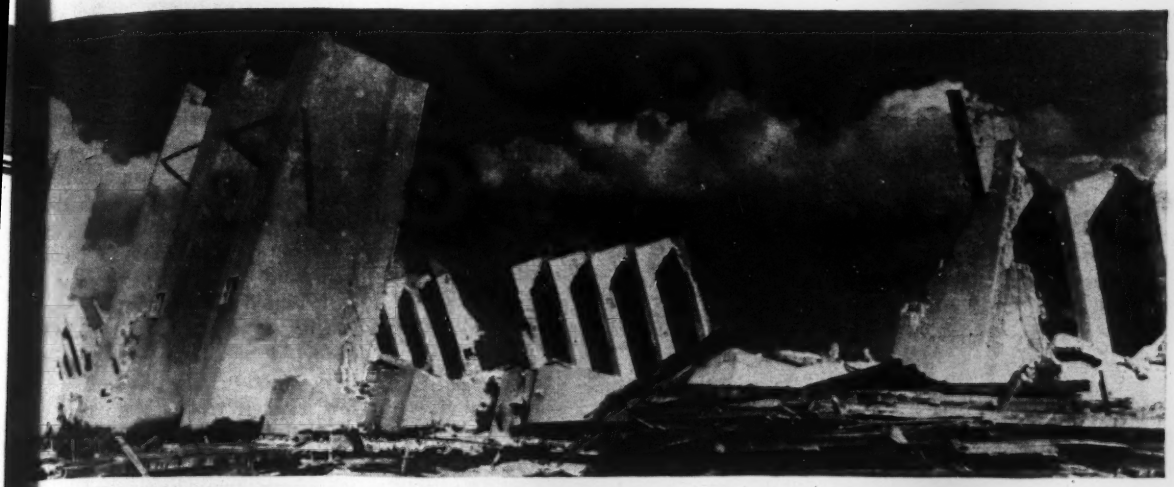


Fig. 1. A tandem roller was used to flatten corrugated iron sheets blown off buildings by bomb blasts. In some cases the sheets were put back on the buildings, but many of them were used instead as a foundation for pierced steel plank parking aprons.

Dirigible hangars wrecked

Included among the comple wrecks were two huge Freyssi concrete-arch dirigible hangars, ea measuring 300 x 984 ft. in plan a 195 ft. in height at the crown. Th produced an estimated 50,000 to of rubble and reinforcing steel, whi had to be disposed of. In additio there were two 200 x 4,000-ft. co crete runways built by the Germa as well as some three miles of 50-f wide concrete taxiways leading dispersal hardstands for their plane and these were pock-marked with rash of bomb craters that had to filled and patched. Fortunately, t German demolition work on t buildings succeeded only in blowi off the corrugated sides and roofs a number of cases so that these stru tures did not present a difficult jo of rehabilitation.

When the engineer battalion ca



2. Ruins of the concrete dirigible hangars wrecked by our bombers furnish a unique sight, so weird as to seem unreal. sidewalls of the corrugated arch surface left standing are about 56 ft. high, broken off cleanly at a construction . In building the hangars, these sections that remain standing were built first, then the central arch section was cast olithically in a huge traveling form extending from sidewall to sidewall.

n Sept. 25, it had two immediate s to perform: (1) fix up the not- badly-damaged East-West run- with surface patches of sand and so that it could be used during few remaining dry days of the r while the almost destroyed th-South runway was being given e permanent repairs to make it able for winter operations; and build steel pierced-plank taxi- s from the ends of the concrete ways to the plane parking and dis- ching area. This job had also to t the winter rains, else the field uld have to be shut down for heavy nsport planes.

In repairing the N-S runway, rked with many bomb craters, e as much as 150 ft. in diameter, her large scale construction oper- ons had to be carried out. Some- es the holes had to be pumped and then cleaned and refilled with ble. The pavement around the es always had to be cut back to nd concrete with air hammers, and ms had to be fitted to the unusual pes of the holes. These forms were de of wood, 1 x 6's and 1 x 8's, and y were placed as nearly as possible line with the longitudinal and nsverse joints in the existing pave- nt. Then the boards were left in ce to lend some measure of pro- tion against expansion and con- ction in the new concrete.

When the N-S runway was finished d opened, work could be under- ken on the permanent repairs to the E-W runway. However, air traffic had increased to such an extent by that time that the patching had to be done without taking the runway out of service. Whereas a 34-E paver had been used in normal manner on the N-S runway, on this one ready-mixed batches were required, hauled to the runway in dump trucks. No quick-setting cement was available, so that a minimum 7-day curing period for each patch was required. Often, the A.T.C. pilots had only a third of the runway width open to them at a patch location, but none of them ever damaged a patch or ran his plane off the runway.

A recapitulation after the runway jobs were completed showed that patches covered 24,000 sq. yd. of their surface or about 13 percent. Also, in repairing the runways about 6,000 cu.yd. of concrete, taking 1,500 tons of cement, was required to provide a 9-in. slab over all of the bomb craters, whose filling with rubble was an additional job of considerable magnitude.

Mud complicated problems

Some 5,000 ft. total length of the pierced-plank taxiways were built. Ordinarily, this amount of plank laying would take a battalion only two

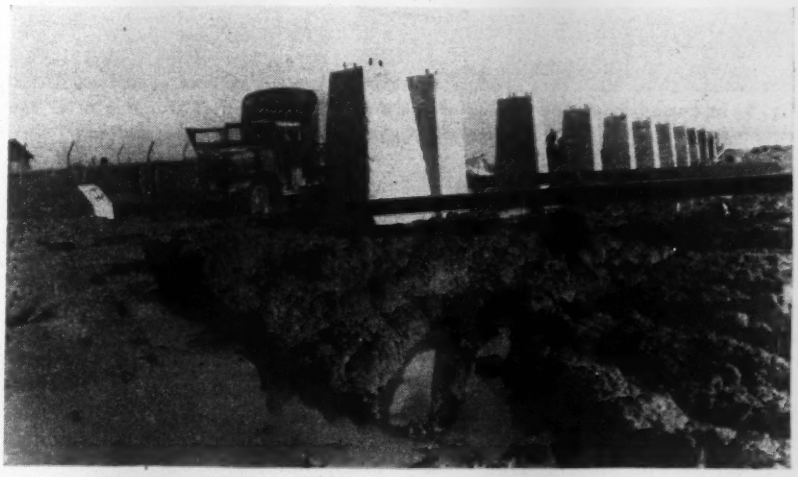
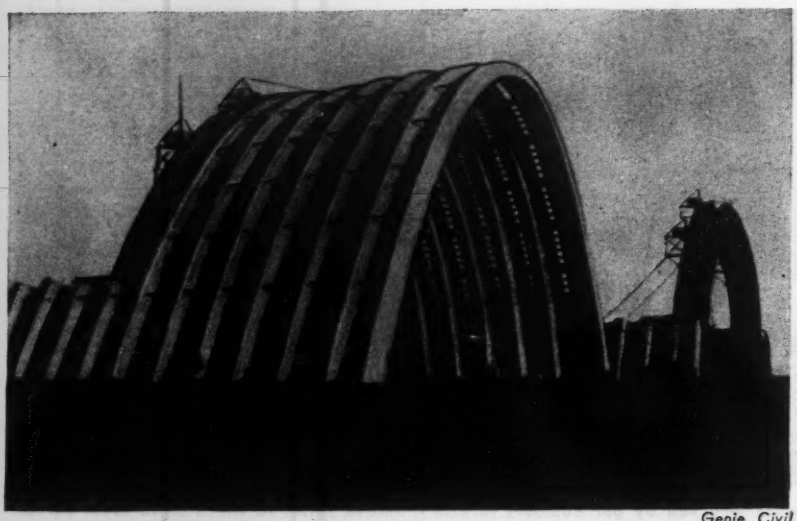


Fig. 3. Typical of what the Engineers had to fight was the mud condition at this erection site where 6-ft. high concrete piers were constructed to raise a rebuilt hangar high enough to clear a C-47 cargo plane. The small abutment at the left is an anchor for an inclined wind strut, a feature of this particular hangar design.



Genie Civil

Fig. 4. Before they were bombed these reinforced concrete dirigible hangars each were 300 ft. wide, 195 ft. high and 984 ft. long, arched in the shape of a catenary. Each shed was composed of 40 corrugations, 3½ in. thick, 24.6 ft. on centers, varying in depth from 9.8 ft. at the crown to 17.7 ft. at the supports.

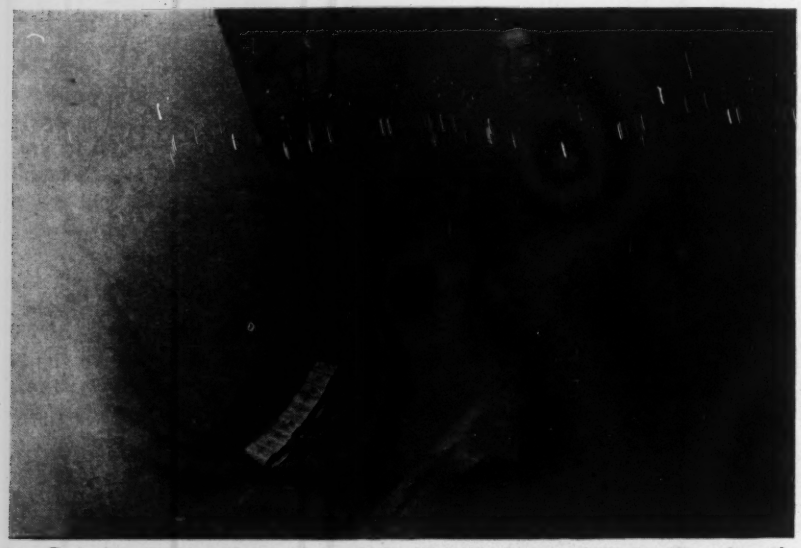


Fig. 5. In demolishing the sections of the dirigible hangar left standing after the bombing, 15 lb. of T.N.T. was discharged against the base of each section.

or three days, but it rained every day and night for a period of five weeks, so that the taxiways were just barely finished in time. The transport planes, which were pulling themselves through mud that was often on the point of engulfing their wheels, could not have negotiated worse terrain.

The procedure used was to haul in rubble and spread it for a foundation. It might have worked well in a dry period, but the liquid mud swallowed up the rock almost as fast as it was dumped. Finally, however a foot or more of the rubble was in place and after being covered with a layer of smaller stone and sand the pierced steel plank was laid and welded.

The big job on the taxiway construction was rubble haulage, since a total of 10,000 cu. yd. was eventually required. About 2,500 yd. was obtained from destroyed buildings on the airport, some 2,000 yd. had to be hauled about ten miles from a dump in a nearby city, while the remainder came in at a river barge terminal about four miles away.

Since the battalion's trucks were busy on the runway patching in the daytime, all of this hauling had to be done at night. For this work there were available thirty-seven 2½-t dump trucks and fourteen 4-t trucks. In addition, three 12-y carrying scrapers were drafted in the haulage service, and made fo round trips a day each to the river.

It was punishing service for t equipment, but it stood up exce ingly well except for the tires, whi were cut and bruised by the loo nails and pieces of reinforcing st with which the airport site was i fested. As many as thirteen flat ti occurred in one night of operati In connection with this haulage job, few French trucks were hired, a among them were several old Ma Bulldogs, said to date back to 19 when our Army Engineers were he before.

Unusual base for parking area

As operations expanded, a muc larger parking area for the planes w required and this, too, had to be bui of pierced plank. Profiting, ho ever, from the not-too-good results o the taxiways, a new design was tri after being tested on a smaller fie in the vicinity. First operation was t reclaim a large amount of corrugate iron sheet that had been blown o the buildings. This involved princi pally laying the sheets on the groun and flattening them with a road roller They were then placed on the muddy ground in the apron area to serve a a floating foundation. On top of th sheets there was deposited a foot-thick layer of straw, which compressed t about 4 in. to provide a bed upo which to install the pierced plank which was welded into a continuous surface.

The results obtained with this type of construction have been satisfactory considering the bad mud conditions.

Hangar clearance increased

With these jobs out of the way, work began to turn to more per manent types of improvements, one such operation involving construc tion of a steel hangar for some C-47's being used by the French. The struc ture to be used had been dismantled and hauled in from another field and, while it was of satisfactory size gen erally, its vertical clearance was in sufficient. Accordingly, the battalion built a series of concrete piers 6 ft. high upon which the hangar could be mounted. After the piers on one side were complete, the site became so

dy that the entire concrete floor had to be laid to provide a work-platform for the men and for the s that brought the concrete for piers on the other side.

nother small job has been to d a new control tower nearer the ways, and this has required, first, rounding up of enough structural , and then the assembly of it, by ling, into a tower about 40 ft. upon which the enclosure for control officers can be built. But most extensive job of a permanent re is complete removal of the is of the dirigible hangars. That was undertaken in anticipation ven more permanent construction e form of a large concrete park-apron, a mile of 100-ft. wide con- taxiway and 1,000-ft. extensions e runways.

Destroyed hangars were unique

t the time of their construction in 3, these hangars (Fig. 4) were sidered to be of an unusual nature use of the design adopted. Each was composed of a 3½-in. thick, oth-surfaced, monolithic, rein- ed concrete arched shell in the n of a catenary, supported di- ly on the 3-ft. thick continuous, nforced foundation slab, which ed on a sandy clay of medium sistency. Rigidity in the arch was ined by regular corrugations of surface, tied by 5.5-in. square, nforced concrete beams spaced at ft. intervals along the exterior . In cross-section the depth of arch varied from 9.8 ft. at the wn to 17.7 ft. at the support. At ends of the structure the two semi- ments were completely closed hol- sections. The door area con- ed of a parabola with vertical axis ft. high and a base of 229.7 ft. The bombing left intact only a few tom sections of the arches (Fig. extending upward about 56 ft. to location of a construction joint. se standing parts had first to be cked down, and for the purpose ut 15 lb. of T.N.T. was discharged the outside of each corrugated sec- n, as shown in Fig. 5.

The debris removal is largely a k and shovel job. Partly because the muddy condition of the area partly because industrial track available, a system of narrow- e railways has been laid down, r which hand-pushed side-dump cars haul the debris to elevated platforms on the edge of the area where it is deposited directly into trucks for removal to points of necessary fill. The track had been used by the Germans to transport bombs to the various dispersal points where their planes were parked, and many hundred feet of it were available.

Handling the great amount of steel rod, about the thickness of a lead pencil, which was used to reinforce the shell of these unusual structures, is a particularly troublesome problem. However, as it is freed from the concrete by picks and shovels, it is rolled up like tumble weeds by bulldozers and pushed off to one side. No further steps toward its disposal can be taken since there is no demand for scrap steel in France today.

Future of field undecided

When and if this field will be developed with all of the permanent facilities necessary for first-class, large-scale, international operation are questions still undecided, but believed to be receiving consideration. In the meantime, the Engineers must not only keep the field in operation but steadily improve it.

One current task encompassing both of these objectives relates to the concrete taxiways around the field, which were not built for the heavy C-47's and C-54's, and, consequently, require continuous repair. The job would not be difficult if the taxiways in one section of the field could be closed to traffic, but this is impossible. Accordingly every repair patch calls for the construction of a pierced plank detour road for the planes, an operation that requires more actual man-hours than the repair patching. Finally, in addition to the patching, all turns in the taxiways are being widened, and large fillets are being installed at all branches and hardstands so that the heavy planes will have more maneuver space.

In all of this work the Engineer aviation battalion has become an integral part of the A.T.C. organization at the field, and takes great pride in its part of the job of keeping the overseas air transport lines open. The type of construction it has to do is makeshift compared to the large bomber fields it built in England between October, 1942, and September, 1944, but there is a realization that it is just as important. One tip-off to the character of the outfit is the care it gives its equipment, some of which it has had since its training days in the Spring of 1942 at Hammer Field, near Fresno, Calif. Such long life speaks well for the equipment, which includes a 14-S mixer, a ½-yd. shovel, three D-7 tractors, a tandem roller and a three-wheel roller, but it also means more than ordinary attention to handling and maintenance. Commanding officer of the battalion is Lt. Col. Robert W. Gesecus of Freeport, N. Y., engineer and salesman for a power-plant equipment company before the war.

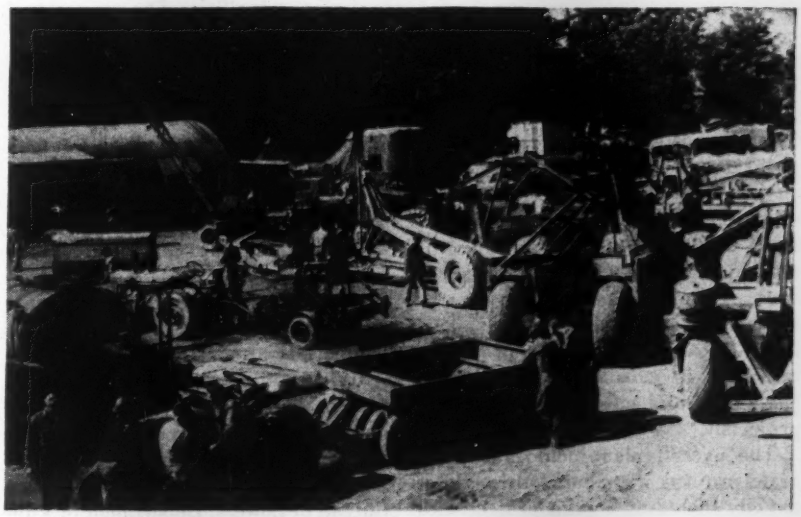


Fig. 6. Assembled equipment of an Engineer aviation battalion, some of it dating back to the Spring of 1942, formerly used to build bomber fields in England, but now converting a French airfield to our use.

Chicago Daily News Photo

Fig. 1. Flooded underpasses will be a thing of the past when Chicago's postwar sewer program is completed.

Chicago Adopts Huge Sewer Program

***Contents in Brief**—An $84,596,000 sewer construction program has been adopted by the city of Chicago as one of its most urgently needed postwar undertakings. Consisting of 16 separate projects distributed throughout the city, this over-all program of stormwater and sanitary sewers will give much needed relief to existing inadequate drainage facilities. The area served covers 49,000 acres, and will provide direct benefits to 1,451,000 residents.*

RECENT ACTION of the Chicago City Council approving a proposed $84,596,000 postwar sewer construction program focuses attention on that city's plan to raise its health standards, retard the spread of its blighted areas and eliminate the nuisance of flooded basements and underpasses by providing an adequate system of stormwater and sanitary sewers. This is no postwar "dream" program; rather it is considered one of the city's vital and most urgently needed projects.

The overall plan includes 16 separate projects distributed throughout the city including a joint project with the Sanitary District of Chicago, and a $2,000,000 city-wide program of miscellaneous sewer construction and reconstruction. Some 161 miles of new sewers are proposed, ranging in size from 15 in. in diameter to a 17x19-ft. horseshoe-shaped section.

Drainage areas to be benefited by the proposed sewer systems aggregate 49,000 acres (Fig. 2); nearly one-third of the city's area. An estimated 1,451,000 Chicago residents will benefit directly by the improvements, when completed.

Chicago's need for enlarging its present inadequate system of sewers has been apparent for the past several years. In view of this, a comprehensive program was outlined by the Bureau of Sewers, Department of Public Works and submitted last March to the city's Engineering Board of Review for examination. After several months of study the Board of Review prepared a complete report on the proposed sewer program which was approved by the Planning Committee of the City Council. This plan was adopted by the council on January 31.

Many plans are ready

In the meantime the Bureau of Sewers pushed the preparation of plans as rapidly as its limited design personnel would permit. Plans have been virtually completed on several of the projects and construction can be started as soon as funds are provided and wartime restrictions on construction materials are removed. Methods of financing this huge construction program, expected to extend over a period of six to ten years, have not been formulated at present but city funds probably will be raised through special bond issues.

Largest single project in the proposed program is the Kostner Avenue sewer system (Fig. 3) covering 7,200 acres on the far west side of the city

xtreme limits of this project in- Wellington Ave. on the north, St. on the south, Harlem Ave. on est and Central Park Ave. on st. At 26th St. it will connect large outlet sewer built from ainage canal to 26th St. as part evious program. Some 36 miles sewers of varying sizes up to 13.6-ft. horseshoe section are in- d in this area, serving 300,000 ns. Estimated cost of new con- ion is $16,700,000 representing capita cost of $58.00. This nt compares favorably with projects in the program.

Old sewers inadequate

general, the condition of the ex- sewers in the Kostner Ave. dis- s representative of that in many districts of Chicago. These old its are inadequate to handle the e of stormwater coming into resulting in backwater flooding ments and underpasses, such as one shown in Fig. 1 located in d Ave. east of Kilpatrick Ave. fact, there have been instances water has reached the manhole s in Central Ave. south of Madi- St. Surveys have been made, s have been selected, and sewer and gradients have been deter- d for most of the new conduits in project and construction can be ed as soon as funds are allotted materials are made available.

nother large project in Chicago's war sewer program is the Central h Side project extending from hing Road to 87th St. and from oint just east of Ashland Ave. ward to Lake Michigan. By joint ement the Sanitary District of cago will design and construct main trunk lines in this 12,000- area, while branch lines will be by the city. The main trunk will, in general, be tunnel con- ction. Their estimated cost of $15,- 000 is not included in the $84,- 000 city sewer program.

Two programs planned

ue to the size of the proposed pro- n and the number of projects in- ed, a careful study was made to rmine the proper priority for ting work in each, in order to pro- adequate sewers for the greatest ber of people in the shortest time. ically, the plan is divided into two grams: (A) amounting to $28,- 309,000 includes projects either in the downtown Loop area or directly adjacent to it: (B) totaling $56,287,- 000 is made up of those 10 proposed projects located outside of the down- town area.

Although Program A is only one- half the size of Program B in dollar volume, present plans are to finance and construct both programs concur- rently, allocating 50 percent of all funds becoming available yearly to each program. By this procedure the downtown sewer improvements will be completed considerably in advance of those in the outlying districts where they are not so urgently needed.

Two projects under Program A have each been assigned a number one priority for beginning construc-

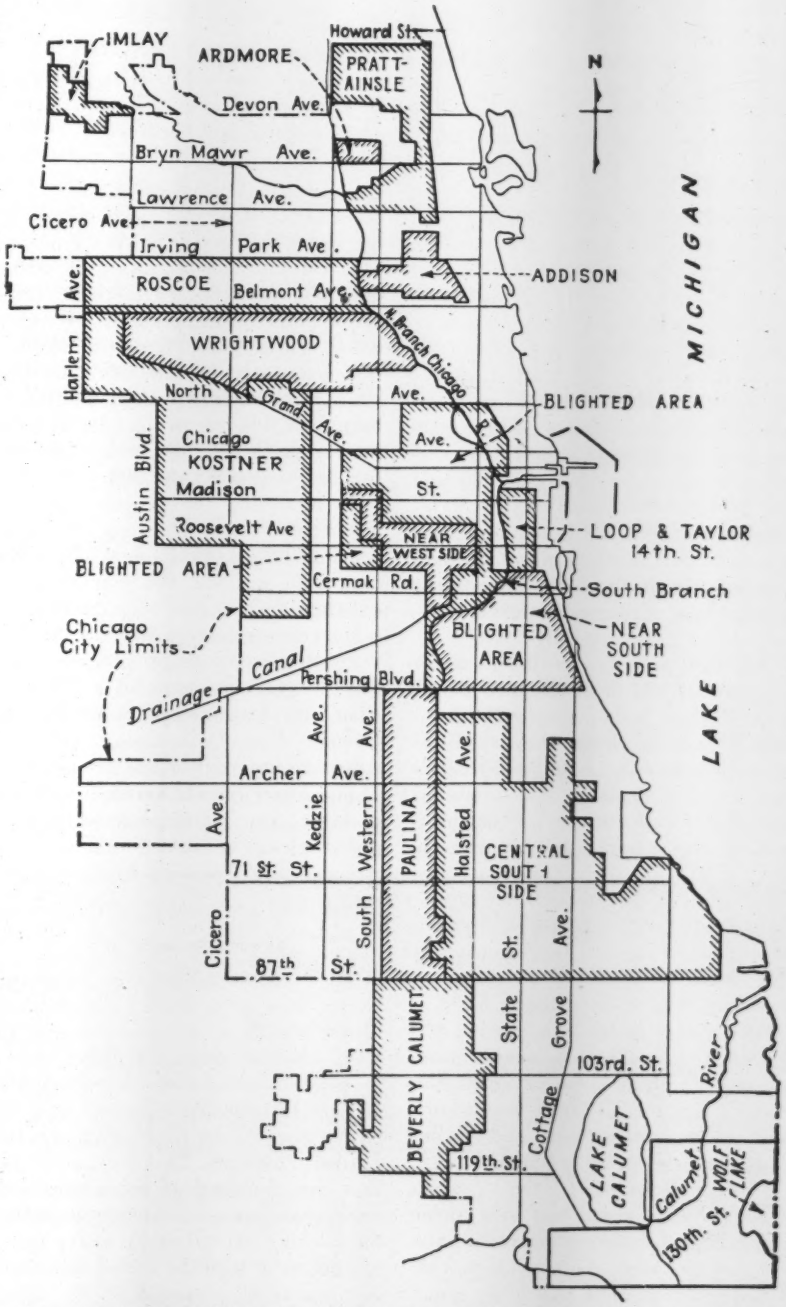


Fig. 2. Drainage areas to be benefited by the 161 miles of new sewers are separated into 16 different projects with each being assigned its proper priority for starting construction.

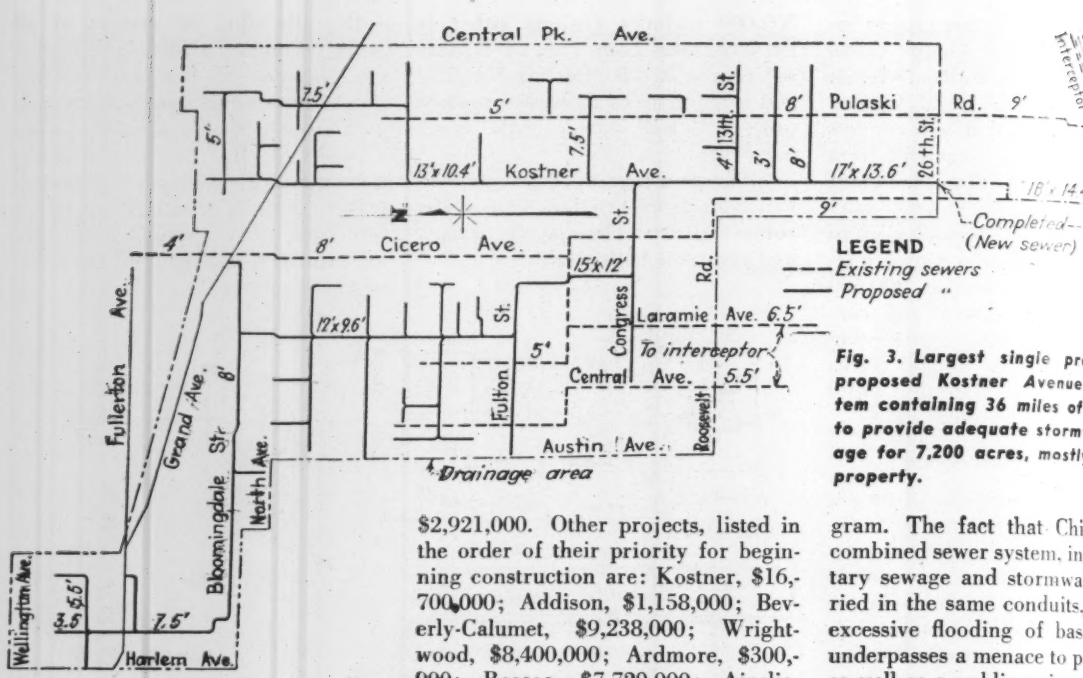


Fig. 3. Largest single project is proposed Kostner Avenue sewer tem containing 36 miles of new se to provide adequate stormwater d age for 7,200 acres, mostly reside property.

tion just as soon as funds are available and wartime restrictions are removed. They are (1) the Loop project estimated to cost $1,200,000 and the $1,650,000 Taylor-14th St. project just south of the Loop. Frequent and excessive overloading of existing conduits within these two areas make construction of the new sewers mandatory as soon as possible.

Second priority position under Program A has been assigned to the Central South Side project. The Sanitary District will begin its part of this sewer installation as soon as possible and the city plans to coordinate its construction accordingly. Other projects scheduled under this program, in the order of their priority are: New pumping facilities at underpasses now subjected to frequent flooding during heavy rainfall (no estimate for this work is available at present); the near West Side project, $4,487,000; the near South Side project $4,072,000; miscellaneous sewer installations in blighted areas (no estimate); and the city-wide miscellaneous sewer construction and reconstruction project, $2,000,000.

Under Program B the Paulina sewer project located just west of the Central South Side system rates number one priority. This project, half completed at present, will bring much needed relief to sewers inadequately serving some 56,000 people. The remaining portion is estimated to cost $2,921,000. Other projects, listed in the order of their priority for beginning construction are: Kostner, $16,700,000; Addison, $1,158,000; Beverly-Calumet, $9,238,000; Wrightwood, $8,400,000; Ardmore, $300,000; Roscoe, $7,720,000; Ainslie-Pratt, $3,996,000; Imlay, $400,000, and the 130th St. project located on the far south side of Chicago and estimated to cost $5,454,000.

In analyzing the proposed stormwater relief sewer program, the Engineering Board of Review not only took into account the condition of existing sewers, but also considered other relative factors such as the developments and improvements outlined in various items of a "Master Plan" for Chicago, prepared by the Chicago Plan Commission. Of considerable importance was the location of new sewer lines to avoid, insofar as possible, any interference with proposed subway construction, new street paving, and depressed highway construction.

Sewers in open cut

Most of the new sewer installations, except those proposed by the Sanitary District will be in open cut due to their shallow depth. Conduit sizes, in general, are based on stormwater intensities expected to occur once in five years and not from maximum recorded intensities. This recognizes the fact that flooding of basements and underpasses may occur at rare intervals during exceptionally heavy rainstorms, even with the added storm relief sewers as proposed.

Basement and underpass flooding, however, will be kept to an economical minimum under the proposed program. The fact that Chicago h combined sewer system, in which s tary sewage and stormwater are ried in the same conduits, makes excessive flooding of basements underpasses a menace to public he as well as a public nuisance.

During dry weather, sanitary age is carried in the city sewer tems to an especially designed st ture where, by means of diver gates and dams, the sewage is verted to Sanitary District interc ing sewers and through these to s age treatment plants. During a sto however, the combined sewage stormwater is of such large volu and of such a diluted nature that greater portion is permitted to f over the top of the diversion dam discharge directly into the Chic River.

Engineering personnel

Original plans for the propos postwar sewer program were prepar under the direction of T. D. Gar superintendent, Bureau of Sewers, porting to Oscar E. Hewitt, comm sioner of public works. The final r port on the sewer construction p gram was prepared by the staff of t Engineering Board of Review und the direction of P. F. Girard, pr ects engineer and G. S. Salter, assi ant engineer.

Other engineers assisting with t study include: Harry Forrey, chi engineer and A. J. Schafmayer, assi ant chief engineer, Bureau of Sewer Department of Public Works; a O. L. Eltinge, engineer of sewer d sign and J. W. Towne, assistant eng neer of sewer design, of the Sanitar District of Chicago.

Floating Drydocks of the U. S. Navy

Part II—Building Yards and Construction Procedures

Hal W. Hunt
Associate Editor, Engineering News-Record

ROAD PICTURE OF THE WORK in- ed in the Navy's floating drydock ram was given in the March 8 in the first article of this series hat great undertaking of the Bu- of Yards and Docks. The prin- l types of docks were described their designs were outlined in as h detail as is possible at this time. struction of the floating dry- s was carried out by 23 contract- firms in 28 building yards.

his article and the one that is to w relate to the construction op- ions, some of which were modi- ions of normal shipbuilding pro- ures while others were quite novel in character. Especially notable is the variety of methods used in construction of the drydocks and in launching them. Of outstanding interest to construction men are the means used to build concrete floating drydocks, first such vessels built in this country.

Every job had in it possibilities for an interesting construction story, but as such complete coverage is not practical for an account of this kind, representative operations have been selected for detailed study. Descriptions of the operations in several yards are given in the following; work in still other yards will be reported in the April 5 issue.

FLOATING DRYDOCKS OF CONCRETE

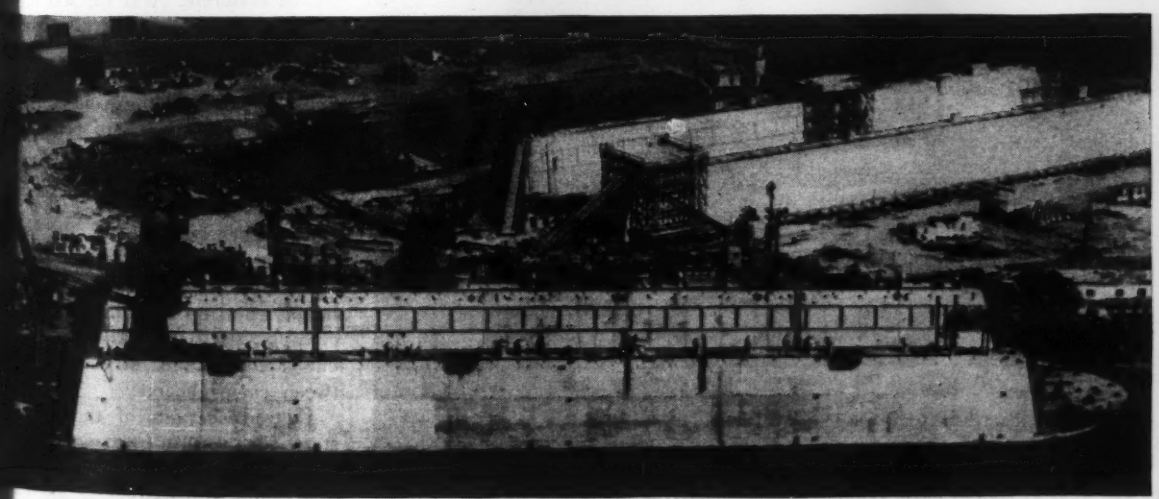
raveling bridges spanning 100 ft. each of two construction basins shorter, but higher, bridges over wingwall were used by J. E. dock, Ltd. for building concrete ting drydocks at San Pedro, Calif. se drydocks are the largest such s ever built of concrete. They are ft. long and have a lifting capacity of 2,800 long tons. Some of the units have been towed to advance bases in the Pacific without sign of distress and have proven entirely satisfactory in use.

The concrete pontoon hull is formed the same fore and aft, and is divided into twelve separate compartments by a watertight bulkhead on the longitudinal centerline and by five transverse bulkheads. At the center a double bulkhead is used to provide a permanently dry passage between wingwalls, even when the dock is submerged.

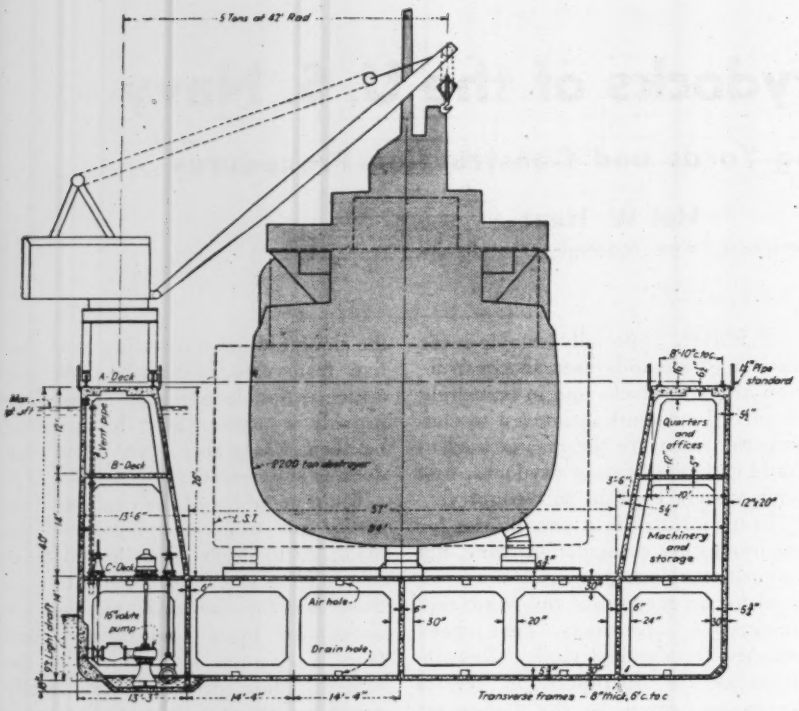
Main members of the concrete drydocks are transverse frames 8 in. thick, 20 to 30 in. deep and 6 ft. c. to c. Principal reinforcement is in these members as main stresses are occasioned by a concentrated load from a ship on keel blocks at the center. Main stresses longitudinally are taken by the watertight center bulkhead, non-watertight bulkheads below the inside face of each wingwall and by the side-shells of the hull. All bulkheads are 6 in. thick while bottom, side-shell and deck are $5\frac{3}{4}$ in. thick. Only moderate reinforcing is required in the walls due to the large effective depth.

Built in basins

Construction was handled in two basins side by side, each about 400x100 ft., with excavation in sand to a depth of El. —14 where low tide elevation is at El. —1.5 and sur-



crete floating drydocks were built in basins, utilizing rolling bridges for placing concrete in pontoons and wingwalls.



Unlike concrete ships the ARDC's have few complicated sections and are made of normal rather than light-weight aggregate.

rounding ground is El. + 8 to 10. The basins were kept unwatered by wellpoints at 8 ft. c. to c. driven to El. —21 around the perimeter of the excavated area. Side and inshore end walls of the basin were formed by horizontal sheeting back of wood piles driven at 6 ft. c. to c., the same piles being used to carry a track for a bridge used in placing concrete. Wood piles supported the load of the drydock during construction, the transverse caps, spliced continuous across the basin, taking the thrust at the bottom of the sidewalls as well as the load of the concrete. Thrust at the top of the basin wall was taken by tie rods across the 35-ft. width between the basins and by ties to buried anchors at the outside wall.

Driven piles at side of basin support rails for construction bridge as well as forming the basin wall.

V-grooved, 8-ft. long wood sheeting was driven vertically into ground below El. —14 the bottom the horizontal sheathing, to prev loss of ground by washing when basin was flooded. Top of the verti sheathing was held by wales brac against the end of the transverse p caps.

During construction of the bas an earth berm was left to close t outshore end but was replaced by gate before the first dock was co pleted. The gate used was of ver cal timber construction, hinged a counterweighted to swing out a down when released. A concrete s took the thrust at the bottom and closed, steel box-girder took the t load. When the basin was flooded the girder floated from its own buo ancy and was towed out of the wa

Foundation piles for the concre drydock construction were spaced provide a row of supports tra versely under each frame of the ves at 6 ft. c. to c., and longitudinal under each bulkhead and at ea panel point in the frame. Piles we capped transversely with 12x12-i timbers. Above the cap and paral to it pairs of 8-in. wide wedges we used to support and level up an 8x1 in. beam that carried the dock durin construction.

Concrete placed in five lifts

The plan followed for construction of the concrete drydocks was to for the bottom and up to the 3-ft. 6-i waterline to include the bilge and th bottom beam of the frame in the firs pour, which required some 917 c yd. of concrete. Next lift was to th top of the pontoon deck, requirin about 1,500 cu. yd. of concrete fo lowed by a single pour to the B-deck and two pours to the A-deck. There is about 500 cu. yd. of concrete in each wingwall.

Bottom forms were supported o two 2x4's on each side of each of the carrier beams. The 2x4's, bolte through so that they could be dropped for stripping, carried panels of ⅝-in. plywood on 2x4-in. studs at 8 in. c. to c., the panels and studs being cut a little short of the width be tween carier beams.

Curved sections of the bow and stern forms were preassembled on a carpenter yard platform, then cut apart and transported to the basin for erection. The ends of the con-

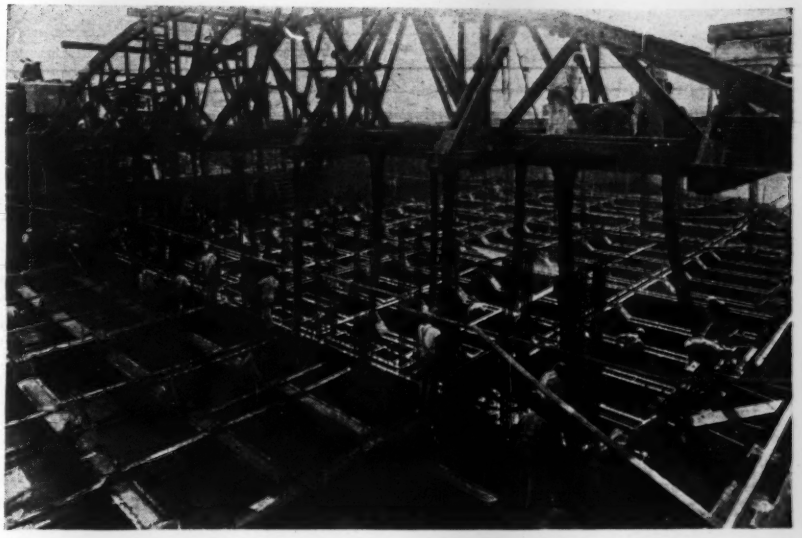
crete drydocks were designed as warped surfaces so studs were cut and braced to position for the full height of the pontoon deck and covered with ⅝-in. by 2-in. boards. End forms then were lined with ⅛-in. plywood to smooth out the surface.

Forms for the typical dock sections were carefully detailed and fabricated in the carpenter shop. Bilge exterior forms were built in 6-ft. widths and 3 ft. 6 in. high to match the inside form built to fit between the frames of the drydock up to the first construction joint. Above that joint the exterior forms were made in 8-ft. wide by 10½-ft. high panels while the interior forms were continued in a width to fit the frame spacing.

Forms for the wingwalls were built in panels the full height to the B and A decks respectively. Inside forms for the pontoons and outside forms for the wingwalls were set up and securely positioned. Reinforcing steel, cut and bent on the job and preassembled, in so far as was practical, was set and fastened rigidly in position followed by forms for the exterior of the walls.

Plywood, ⅝ in. thick, was used throughout for regular shaped forms, backed with 2x4-in. studs at 8-in. centers. The forms were held by horizontal wales 2½ ft. apart, tied with ½-in. dia. rods. Through watertight walls the ½-in. rods were fitted with 1½-in. dia. washers welded on as a water-stop. Inside threaded rods with a rapid action exterior thread were used to hold the ties and permit removal of all metal from near the concrete surface. Non-watertight bulkheads and cross-frames were tied with ½-in. rods, without water-stops, and the entire rod removed. Concrete was purchased delivered, where and as required, from a commercial ready-mix contractor who set up a plant at the site. Mixing was done in truck-mounted, 4-cu. yd. units, the trucks being held at the plant for five minutes to assure adequate minimum mixing time.

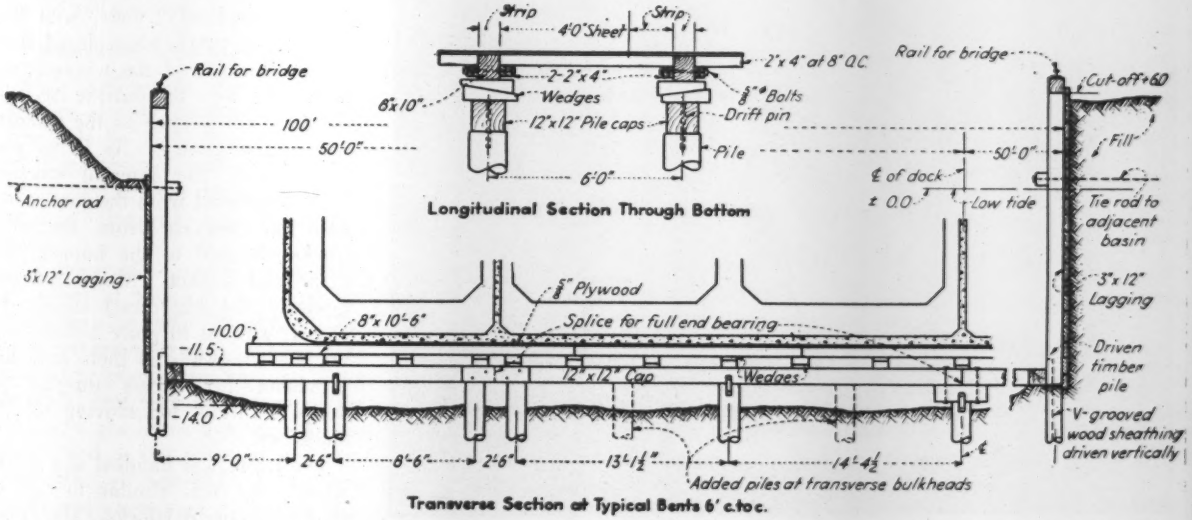
The mix used contained 8.4 sacks of cement per cu. yd. of concrete with 4.8 gal. of water per bag of cement. The aggregates were 40 percent sand and 60 percent up to ¾-in. gravel (137 lb. of sand and 205 lb. of gravel per bag of cement.) Lightweight aggregate was not used, a concrete weight of a little more than 150 lb. per cu. ft. being obtained. Slump varied from 3 to 7 in. and test specimens showed strengths of about 4,000 lb. in 7 days and 5,300 psi. and upward at 28 days.



Concrete dumped through the far side hoppers goes to the drydock bottom while concrete placed through near hoppers fills the frames of the drydock. This bridge was used for placing concrete up to the pontoon deck.

Construction bridges span work

A rolling bridge over the building basin was used to distribute concrete to the pontoon section of the



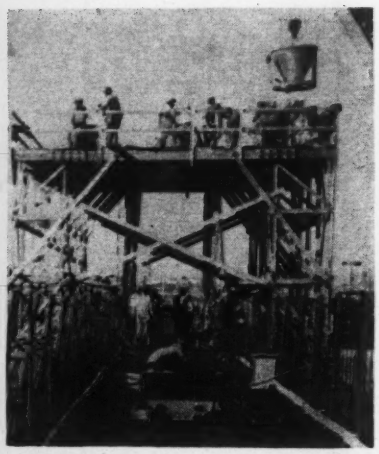
Caps across the timber piles were spliced continuous to resist thrust of the outside earth at the bottom of the basin. Rails carry bridge used for placing of concrete.

drydock and a higher tower, spanning only one wingwall, was used for placing concrete above the pontoon deck. The bridge, of trussed arch design, spanned 100 ft. between rails, and was supported on caps over vertical piles that also held the basin wall. The bridge was built with a 14-ft. wide walkway to provide ample space for operation of concrete buggies and rolled on double-flanged wheels being moved as desired by hand-operated winches.

Concrete through rubber spouts

The bridge had eight chutes along the forward edge and a similar number along the trailing edge through which concrete could be dumped for placing in the 84-ft. wide drydock. For the first pour, where the concrete had to be dropped about 15 ft., an 8-in. dia. section of "elephant trunk" fed into an 8-in. dia. rubber tube suspended from the hopper. It extended to the top of the form so concrete could be dropped with a minimum of segregation. Flexible-shaft electric, internal vibrators were hung from the bridge on ropes and carried along for hand-held operation as required.

Concrete was brought alongside the bridge in truck-mounted mixers and discharged into 1-cu. yd. bottom-dump buckets that were hoisted by cranes to a buggy-loading hopper at each end of the bridge. Two-wheel



Separate bridges spanned each of the wingwalls and were used for placing concrete in each of the two walls

buggies were used on the bridge to dump concrete into the chutes as required.

For the first pour of concrete, placing started at one end and was completed in one pass as the bridge moved along the full length of the drydock. Concrete was dumped through the forward chute for delivery to the bottom of the dock and through the rear chute, some 12 ft. back, to feed into the cross-frames, bulkheads and sidewalls to bring them up to the 3 ft. 6-in. water line. The bridge advanced in 6-ft. moves, the spacing of the concrete frames.

The same bridge was used for the second pour, which included the frames, bulkheads, sidewalls and the pontoon or C deck. Pouring operations started at the bow with grout applied to the "cold joint" prior to placing concrete. The bridge was equipped as for the first pour except that a two section elephant trunk was used instead of the rubber tube.

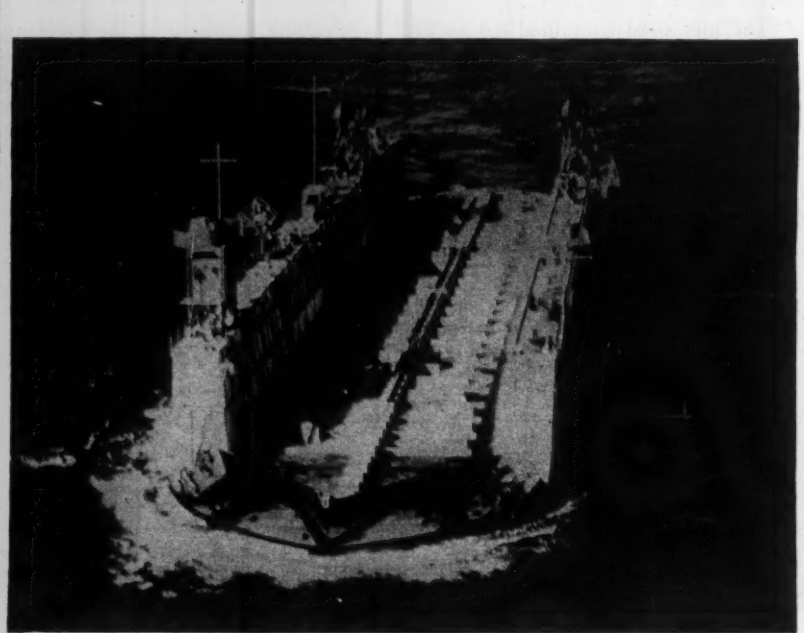
While concreting, carpenters were stationed in the hull and communicated with forces on the C deck by a temporary telephone system. The concrete from the forward edge of the bridge was placed in the vertical walls and frames and allowed to flow forward to its natural slope, all sections being filled to the top of the form before the bridge moved. The rear hoppers were used for placing concrete in the deck.

Short bridge for wingwall concrete

Concrete for the wingwalls was placed by a separate traveling scaffold or gantry, spanning 27 ft. 6 in. to clear the forms outside the 13-ft. 6-in. wide wingwall. This unit was 16 ft. long and 28 ft. high, the outboard supports moving on the rail which had carried the bridge spanning the entire dock. The inboard side was supported on two 2½-ft. dia. rubber-tired wheels that rolled on the pontoon deck. Again, the gantry was moved by hand-operated winches, located on the scaffold deck where the crew handling concrete could control the movement of the travelling bridge from their work stations.

Four elephant trunks, with 8-in. dia. rubber tubes, were placed above the inside face of the wingwall and four more over the outside face with the 2-cu. yd. hopper on the outboard side of the gantry. As in the pontoon pours, the internal vibrators were suspended from the gantry deck and the concrete from the mixer trucks elevated to the hopper by a crane and bucket. Machinery, particularly the big diesel engines for power, was set in place before forming the wingwalls as there is limited provision for access through the decks or walls for moving the big machines.

Outfitting was handled at a nearby wharf and was similar to that on steel or timber drydocks. More room is available on a concrete drydock for machinery and quarters as the



Press Assoc. Inc., photo

ARDC in tow in Pacific as part of floatable base that has moved with the fleet up to Japan's front door.

Arrangement of framing of 18,000 ton three-piece floating drydock, with end sections in foreground. A compartment on the longitudinal center line of the drydock is made watertight to provide added lifting buoyancy under the keel where the main load of a ship is concentrated. This is Chicago Bridge & Iron Co. assembly at Morgan City, La.

greater dead weight makes it unnecessary to admit water above the pontoon deck to sink the vessel, thus permitting utilization of the entire space in the wingwalls.

Construction was done under a competitive lump-sum bid by J. E. Haddock, Ltd. which also built a 400-ton lifting capacity concrete floating drydock at Olympia, Wash.

C. B. & I. BUILD AT THREE YARDS

Chicago Bridge & Iron Co. was one of the first firms to start construction of floating drydocks in the current program. They have built a larger tonnage of such units than any other organization, utilizing erection yards at Eureka, Calif., on the Pacific, Morgan City, La., on the Gulf, and Newburgh, N. Y., on the Hudson River. Construction has included 14,000, 15,000 and 18,000-ton, 3 piece yard type floating drydocks (YFD's), 1,000 and 1,900-ton steel auxillary floating drydocks (AFD's) and sections of the huge battleships and cruisers' units (ABSD's).

Fabrication at existing plants

With engineering and fabricating facilities already established C.B.&I. were able to start immediately on detailing, procurement and fabrication of steel for the docks themselves while building sites were being prepared.

All fabrication was done at existing plants at Chicago, Birmingham, and Greenville, near Pittsburgh, Pa. Some preassembly was done at the fabricating plants, the amount being varied to best take advantage of the labor and machines available at the plants, and at the point of erection. The ratio of assembly at various plants and yards varied considerably from time to time as employment conditions and the demands on the particular yards or plants changed.

One of the first stipulations for floating drydock construction was that none of it should be done where it would interfere with plant facilities or labor of other Navy construction. C.B.&I.'s first yard was built at Morgan City, La., and the second at Eureka, Calif., both areas where no shipbuilding had previously been done. When submarines were taking a heavy toll of ships on the Gulf and Atlantic Coast, and slow towing of drydocks offered an excellent target for torpedoes, a yard was built on the site of a World War I shipyard at Newburgh, N. Y., to assemble yard type docks for use in the New York and New England areas. All three of the yards follow the same general plan of construction—fabrication at established plants and assembly into only moderate-sized units before erection at the waterfront.

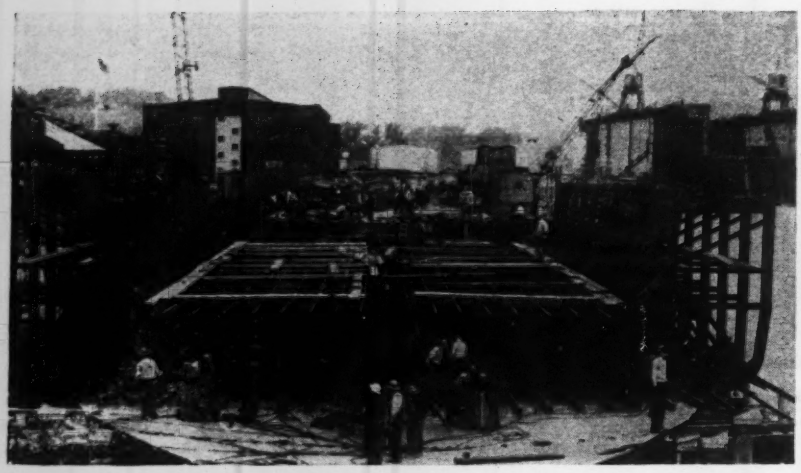
Close-up of "key plates" with pin and shim separators used to fit up a joint between plates for welding. Pins can be used to push, pull or just hold the plates in proper position.

Positioning steel for welding

A method for pulling plates to position and holding them while welding was developed a few years ago by Chicago Bridge & Iron Co., and is used on all their work. Known as the "key" system, it has been made available to the government for use on war construction and has been employed by several of the floating drydock builders.

In this system of welding, blank nuts are set on edge and welded to the plate on either side of the joint to be made up. Welding is done on one side and two edges of the nut to hold it securely yet permit removal by tapping with a hammer on the unwelded side. Specially prepared plates, with square openings larger than the nuts, are set over the nuts and a pin inserted through the nut to hold the plate tight. The "key" plates have a bar welded along each side of the square opening against which a drift-pin can obtain backing to push against the side of the nut and thus force the plate in or out as desired.

Varying angles are provided for by a hinged plate, and special plates are



Buoyancy compartments of 1,000 ton AFD's extend from center bulkhead to top of wingwall framing in foreground. The center section of an 18,000 ton YFD is of the right. Permanent cranes on the drydock wingwalls assist erection.

available to make an accurate right angle. Space between adjacent plates is established by shims, flat pieces $\frac{1}{16}$ or $\frac{1}{8}$ in. thick with a hole for a round pin on one side and a tapered pin opposite, so constructed that they draw the plates to exactly the same plane.

Basins above tide level

At the Newburgh yard construction was done on somewhat conventional side launching ways, but at Morgan City and Eureka sections of the big floating drydock were built in basins above tide level and "locked" out to normal water level. The general scheme for the building basins at the two yards was similar, despite the wide geographical separation.

At both locations the construction done in basins was primarily erection of sections of the so-called battleship and cruiser floating drydocks. Building in basins was desirable to eliminate expensive launching gear and to avoid stresses induced in conventional launching of heavy vessels.

Ordinarily, use of basins is limited to locations where deep, impervious strata of soil is available. However, at Morgan City there was only the unstable silt of alluvial deposits of the Atchafayala River and at Eureka only a thin cover of silty mud over sand.

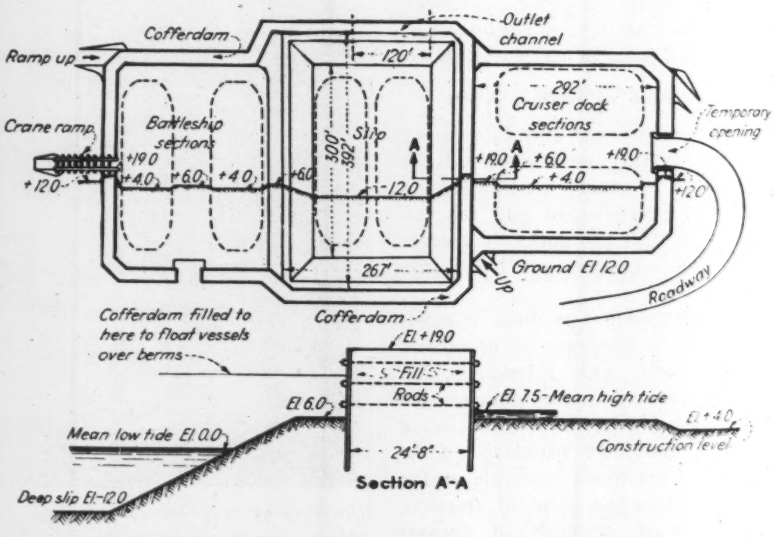
Excavation to the depth needed for a normal construction basin would have required removal of most of the impervious cover at Eureka so that there would have been insufficient weight of material over the sand to counteract the head of nearly 20 ft. of water. Likewise, the weight of silt at Morgan City was far less than sufficient to resist an upward thrust from any appreciable head. By excavating the basins to only shallow depths, building walls around them and pumping water in when drydock sections were to be floated out, the weight of water was downward on uniformly and adequately supported silt. Thus leakage through it, against a much lower head than for a conventional basin, is relatively slight.

A section through the basin at Eureka is shown in an accompanying drawing. Drydock sections were built in shallow areas excavated to El. + 4 with bottom steel laid on supports at El. + 7. Adjacent to this, and separated by a low berm, was a deep slip excavated to El. — 12 and around the entire construction area a cofferdam was built with its top at El. + 19. Originally, only the building area designated "battleship sections" was constructed. When the yard was extended to include building space for cruiser sections, the new area was protected from the deep slip area by a cofferdam. It was built to the same height as the one around the outside so that work in it would not be disturbed by flooding the original construction basin.

"Locked" out to sea level

When drydocks were to be floated out, water was pumped into the basin to El. + 16 to 18, thus lifting the dock sections and floating them off the erection supports. The units were moved out of the shallow area into the deep slip, and the water in the basin siphoned down to normal sea level. A channel could then be opened through the cofferdam, and the dock section towed to an outfitting pier, or the unit could be left in the protected area for further work.

The cofferdam used at Eureka was a rodded-box type with two rows of vertical wood sheathing driven a short distance into the original



Rodded timber cofferdams were used at Eureka, Calif., to provide construction basins above tide level and hold extra depth of water pumped in to float drydock section off their supports and into the deep slip area.

ground and the space between filled with earth. At the outlet from the basin, timbers were arranged in sections for easy removal so as to facilitate opening and closing the cofferdam, and a small hydraulic dredge was employed to remove the fill. On the land side of the cofferdam, temporary openings through the structure were made to permit access for cranes and material trucks. A ramp from the ground to the deck of the pontoon section of the drydock was used to take a crane or material trucks directly aboard to facilitate construction.

At Morgan City the basins were similar, except that earth berms were used for the inclosures without protection of timber sheathing. The basins were arranged for simultaneous construction of four floating drydock sections, two in each of two shallow basins, with elevations very similar to those at Eureka. Carrying scrapers and draglines were used for handling earth to open and close the basins as required.

ARD'S BUILT IN CRAMPED QUARTERS

Pacific Bridge Co. is building all of the auxiliary repair docks (ARD's) in the current program, and in addition has built some units of the big sectional drydocks. Construction was done in four basins or pits on an area originally planned for only one unit, bordering on the Alameda Inner Harbor in San Francisco Bay.

The ARD's are steel vessels, with a closed bow and a gate at the stern that can be opened to admit a ship to a protected position inside. Despite a lifting capacity of more than 3,000 tons, the ARD's require only 5 ft. of water to float before outfitting. Hence basins for their construction could be shallow and were dug out of impervious clay along the channel. Wood piles support the drydocks during construction while piles along the edge of each basin carry a track for an overhead crane. The first basin built had an 85-ft. clear width but it was later widened to 95 ft., the width to which all subsequent basins were constructed.

Natural earth berms, on a slope of about 1:1, were sufficient to prevent water from one basin infiltrating into the adjacent ones when flooded. A hinged timber gate counterweighted to sink, and bearing at the top against a steel truss, protected the water end of the basin. At launching time an overhead crane moved the gate truss out of the way. Outfitting of drydocks was done at nearby wharves.

Facilities Compressed

The area selected as adequate for one building pit finally had to accommodate four, as the program was expanded. Fabrication and extensive preassembly in the yard, not originally contemplated, also became a necessity as commercial facilities in the area were taken by higher priority shipbuilding and similar construction.

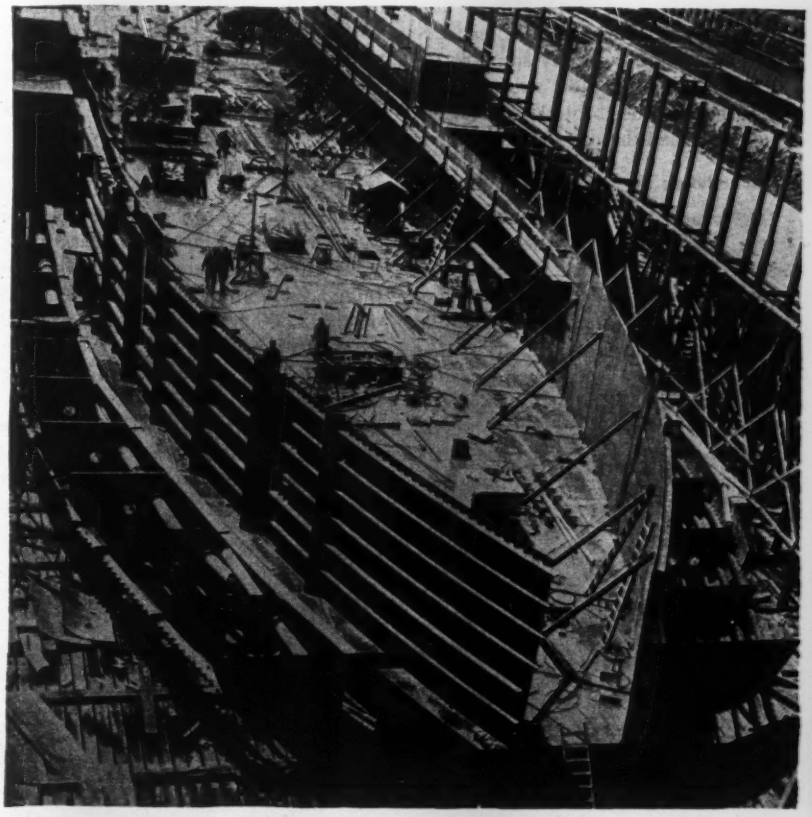
Consequently, shops and machines as well as storage area had to be compressed into a very small area. Elaborate but workable plans were made to get best use of all available storage space without rehandling material. This was accomplished by laying out the entire yard so that the material for each of the docks was precisely scheduled for assembly and movement into the erection sequence just when required. Success of the plan was assured by assigning every small part of an assembly to a "personal representative" on the staff of the job production unit.

Fabrication at the site

Some storage space for incoming steel was secured away from the original site, but all other operations of fabrication, assembly and erection of an average of 1,200 tons per week were done on an area of 27 acres.

Fabrication was done almost completely at the site. Serrated channels were cut by gang torches burning three pieces automatically at one time while roller conveyors made handling easy. Edges were beveled and plates and shapes prepared to size in advance of assembling at the head of the ways. Machine welding was used for all of the flat work and parts were assembled into the largest pieces that could be handled by the 50-ton cranes.

A schedule was worked out so that



The ARD hull is divided into several watertight compartments. A central pump station, with pipes to each compartment, controls flooding and unwatering.

The ship-shape ARD's were assembled in shallow basins served by overhead cranes. Machinery and quarters are in the wingwalls above the second deck.

the assembly platens could be used for storage of some materials. This was accomplished by doing additional assembly on top of completed units with parts stacked so that the pieces needed first would be on top at the time for erection. Considerable planning and supervison was required but the method substantially increased the possibilities for storage space and sped the drydock assembly.

Scheduling for space utilization

The production control department set up a schedule of erection for each basin showing on exactly what day each unit was to be set in place, and followed this with a complete tabulation showing when each part of the work actually went into position. Copies of this schedule were furnished to all interested parties, including the crane operators, riggers and all craft supervisors. The schedule made it possible to tell at a glance exactly when any part of the drydock was to move into the pit for assembly, and showed if a unit was lagging in the preassembly program.

Construction of the 487-ft. long 81-ft. wide ARD's was scheduled for 95 days from keel laying to commissioning, including 63 days in the building pit. Preassembly of material for a drydock started about 30 days before contemplated keel laying. As preassembly proceeded, parts were stacked on top of each other with the first pieces to be erected in the basin assembled last. An idea of the scheduling and handling may be obtained from the fact that 2,500 tons of the 2,800 ton weight of the structural steel in the ARD's was set in place in the drydocks in the first 26 days after keel laying.

Outfitting of the ARD's was done at a wharf near the building pit where cranes on high gantries were available to lift equipment into them. One of the earliest outfitting operations was to set up the cranes that are permanently located on each wall of the drydock. The drydocks were tested by submerging at the outfitting wharf as soon as the equipment was ready for operation.

Big sectional docks

Parts for sections of the big battleship docks were fabricated about the same as those for the ARD's, but the assembly and erection of the few units built did not reach the organization efficiency and speed with which the latter were built. For the first two of the big dock sections, pontoons were floated out of the building pit as soon as they were completed. Meanwhile, the wingwalls had been built in "down" position on a nearby wharf.

Transfer of the wingwalls, weighing 467 tons, from the wharf to the pontoon of the dock section, was accomplished in a manner similar to that of launching a ship. Sliding ways were fastened to the underside of the wingwall, and "ground ways" were made fast on the wharf and on the pontoon. Launching base-coat grease and slip-coat were used on both the ground ways and the skid ways.

The pontoon was brought to the elvation of the wharf and kept there by adjusting the water in the ballast tanks. Two 25-hp. winches (20 ft. per min. line speed, 12 ton line pull) were used to move the wingwall out onto the dock section while two 20-hp. winches were set up on shore to act as snubbers. The winches were never over one-quarter loaded. Transfer of the wingwalls was started just before high tide and required about 1 hr. 45 min. The wharf was on piles and in not too good a state of repair so wingwalls of the subsequent dock sections were built on the pontoons, to avoid the hazard of transfer.

Ship-shaped ARD can drydock the 328 ft. long LSTs, which frequently are damaged in landing equipment.

What Happens at a Surplus Equipment Sale

***Editor's Note**—Using two prior sales as experience and background, the surplus farm and construction machinery section of the Treasury procurement division conducted a third big general sale of equipment at Kearney, Nebr., Feb. 21-22 in a manner that promises to serve as a pattern for all such future sales. Ample time before the sale was allowed for inspection of the items to be offered, all plainly marked with key numbers that corresponded to candid descriptions in the sale list. Then, after legitimate bidders were checked and registered, 1,189 items were disposed of at good prices in 12 hr. actual selling time. The following account was written by H. W. Richardson, Western Editor, who attended the sale.*

IN 720 MINUTES of actual selling time 1,189 items of surplus construction and farm machinery were disposed of by card bidding at Kearney, Nebr., on Feb. 21 and 22, an average of one unit sold every 37 seconds. The sale totaled almost exactly $500,000. Equipment offered was mostly in poor shape, some of it junk, and much of it consisted of units returned from the Alcan Highway and the Canol oil project. However, a few items were in good condition. Estimates place the proportion of good, usable units at 10 percent of the total.

In general, prices were high, even for the poor stuff, but only in a few instances did prices exceed OPA ceilings as determined by OPA and Treasury representatives on the spot. The sale was attended by 1,500 persons, of whom 350 were registered, legitimate dealers and distributors qualified to bid under regulations of the Surplus Property Act of 1944. The crowd taxed hotel accommodations within a radius of 50 miles.

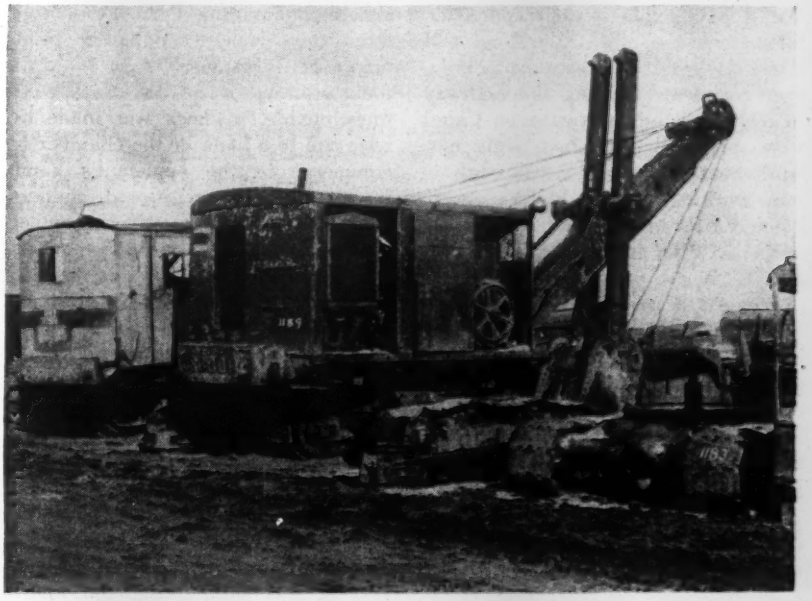
Hotel lobby gossip revealed that the dealers bought about half of the items on direct orders from interested contractors, charging from 5 to 10 per cent for handling the transaction.

Equipment displayed at depot

All equipment offered for sale was on orderly display at the old army engineer depot 5 miles east of town, where Peter Kiewit Sons Co., of Omaha, has rehabilitated thousands of units for further use by the army. None of the items declared surplus and thus offered for sale, however, had been repaired, overhauled or cleaned. Machines spread over acres and acres were grouped as to types for easy inspection, each identified with a sales key number. The display was open to inspection for two days prior to the sale, with Treasury representatives in attendance.

Among the items were 85 tractors, 76 graders, 83 scrapers, 45 mixers and pavers, 182 snowplows, 8 shovels, 12 cranes, 140 pumps, 47 conveyors, 29 material spreaders, 82 buckets and 125 pieces of farm equipment. Other items included wagons, road and sheepsfoot rollers, shovel and crane booms and attachments, greasing units, detached bulldozers, pneumatic drills and paving breakers, scarifiers, sweepers, tractor winches, asphalt heaters, tanks and distributors, a few trucks, pile hammers and leads, rooters and many miscellaneous pieces.

Frankly, the condition of much of the stuff was poor, aptly described by several dealers as "rugged." Many units had vital parts missing, broken or evidently badly worn. Some were virtually dismantled, their component parts piled up in a heap. Several shovel cabs and superstructures were on the ground alongside their respective crawlers and underframes. Engines in some cases were missing entirely. Others lacked heads, radiators and auxiliary items. Very few units designed for pneumatic tires were fully equipped with rubber. Most were minus all tires, some had one or two dilapidated casings, but only in



Highest price of the recent Kearney sale of surplus equipment was $10,055 for this Osgood 1936 model 1½-yd. shovel (No. 1189 shown in center), one of the few fully-equipped items offered.

Even battered and dismantled shovels and cranes like these brought good prices, such as $1,378 for the 1936 Marion ¾-yd. at the left; $825 for the ½-yd. Bay City (center) minus engine, crawler and all clutches; and $3,850 for the ¾-yd. Bay City 1937 model at the right, without an engine.

Prize tractor out of 83 on the sale lot was Item 798, a 1936 Caterpillar RD 8, with LeTourneau bulldozer and power control unit, which was bid in at $6,500, just under the ceiling price. The partly-dismantled 1939 D7 Caterpillar at far left was worth $3,378 to some dealer.

rare instances were they shod all around.

Many units from Alaska

The history of the majority of heavy items explains their condition, for they are the culls of the Alcan and Canol projects. The seven army engineer regiments tackling the highway in 1942 and the contractor on Canol were originally supplied with new equipment. However, the 53 contractors working on the highway were handed a lot of worn out and abused units that PRA gathered up from CCC and WPA projects. After two years of rugged service in the Northland wilderness, where repair parts were hard to get and maintenance was under difficult conditions, much of this equipment was returned to the engineer depot at Kearney. Here everything really worth salvaging was rebuilt and shipped out.

The remainder are the battered dregs. Many units still carried the army's Northwest Division serial numbers. Tags on other read "Hold at Skagway, do not ship," evidence that they were useless upon arrival in Alaska.

The sale was conducted by Treasury procurement division officials, from the Kansas City district, in the state guard armory at Kearney. All prospective bidders were required to sign an affidavit to the effect they were established dealers and had to properly identify themselves as such. If their identity or qualifications were questionable, a check was made by telegram to a bank or the chamber of commerce in the applicant's home town. Properly registered bidders wore a large badge, whose number was recorded on every bid they made. While this system of qualification worked well, and though no complaints were heard, Treasury representatives stated that a method of permanent registration based on careful prequalifications was being developed for future sales.

Bidding was by cards that listed the sale item number, the price bid, the bidders name, address and registration number. A sales conductor, standing before a microphone at one end of the hall, facing the seated bidders, offered the items in consecutive order as listed in the descriptive sales brochure covering 119 mimeographed sheets. Bidders could file their bid cards in advance, or could wait until each item was called. As each item was reached, the conductor would call for bids on that particular item number, allowing time for bidders to fill out the cards and hand them to messengers circulating through the crowd.

As the messengers collected the cards and carried them to the rostrum, they would sort out the high bids and place that card on top of the file handed to the conductor. Then, after making a last call, the conductor would glance at the various groups of cards and quickly announce the name of the high bidder and the amount offered. Each item was cleaned up before the next one was called. Except in two cases, where nine Fresno scrapers were offered in one lot and five more in another lot, the items were offered one at a time. This eliminated criticism of previous sales where, in some instances, several junk pieces were grouped with more desirable units in group lots.

Only the high bid was made public. If a higher figure had been overlooked in shuffling the cards, the bidder was permitted to protest and the cards were checked. In case of error, the corrected high bid was accepted. Meanwhile, the messengers had returned to their respective areas ready to pick up cards for the next item. This system proved both fast and efficient, resulting in a sale every 37 seconds.

Usually the number of bids ran from 35 to 50, but in cases of more desirable items, such as tractors, as many as 150 bids were received. A few units attracted no offers. No attempt was made to place a minimum selling price on any item, for, as Treasury officials explained, "350 competitive bidders set their own values." However, in following the Surplus Act's objective of receiving "a fair price to the government," sales officials temporarily withdrew items attracting only a ridiculously low figure. At the end of the sale, all such items, including those receiving no bid at first, were again offered and most of them were sold at satisfactory prices.

Little trouble was experienced with OPA ceiling prices. Only a few units were in sufficiently usable condition as to make establishment of ceiling prices possible. On such items OPA

and Treasury officials agreed in advance on a ceiling of 75 percent of new cost. In one instance, only the high bidder exceeded the set maximum price, and he was awarded the machine at that price. In a few other cases where several bidders topped the ceiling price, the successful buyer was chosen by lot and given the machine at the established top figure.

This procedure eliminates the trouble resulting from the prior sale at Salina, where ceiling prices were ignored and the Treasury department is now refunding to the successful buyers the difference between their bid and the maximum price as established later. Sales officials at Kearney pointed out that the Salina sales practice is unfair and that spot control is necessary. Otherwise, bidders could offer any fantastic amount in the knowledge that the bidder of the wildest figure would eventually get the machine at ceiling price.

Sales list candid

Each item was described in the sales list as accurately as possible, but the following warning headed the list: "All material listed herein is offered for sale 'as is' and 'where is' and without recourse. The description is based on the best available information, but no warranty written or oral is given or authorized by the procurement division as to the exact quantity, quality, condition, weight, size or description of the property, or that it is in condition to be used for the purpose for which it was originally intended, and no such representation will be considered as grounds for adjustment or recision of this sale. This is not a sale by sample."

However, the sales officials announced that the descriptions in the list would hold if any changes had been made in any particular item between time of listing and official time of inspection. For example, in the assembling and sorting of equipment in the display lot a machine might have gained or lost a tire. If it was listed as being equipped with one tire, and that tire was missing at time of inspection, the government would supply the tire.

Some typical descriptions as listed are as follows: "Item 85—Spreader, Buckeye, ser. no. 9-1088, aggregate, highway, without tires and tubes." It brought $329. A pump that was sold for $326 was described: "Item 98—Pump, centr. 6 in., Jaeger model 6P, ser. no. P-7707. Mounted on 2 steel wheels, stand with pull tongue. Missing: intake and discharge flange. Frame is cracked on front of unit. With Hercules motor 4 cyl. gas model OOC ser. no. 229042."

A scorched and sorry-looking tractor brought $2,901.50, despite the candid description: "Item 716—Tractor Intern. mod. TD18, Intern. semi-diesel 6 cyl. mod. TDRM crawler, 72.38 hp., 74 in. gage, 18 in. track-face. Tractor appears to have been in fire. Bucyrus-Erie PCU ser. no. 23780, yoke hdr. operated. Missing: air cleaner, battery, seat cushions, instrument panel, hood, fan belts, injector pump and hyd. oil tank."

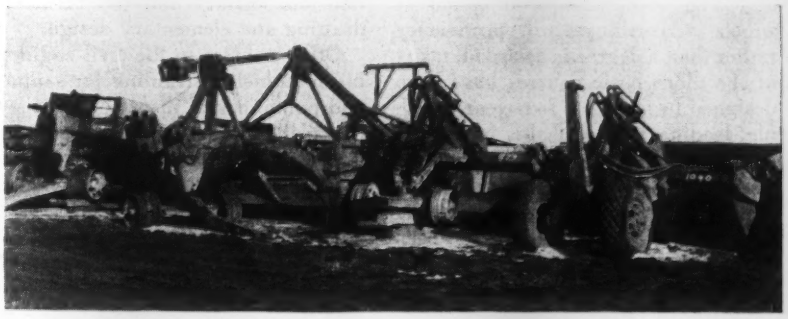
The dealers were buying engines and tires, for any rig equipped with these sold for a good price, regardless of condition of the remainder of the outfit.

The sale's lowest price was $5 for "Item 509—revolving screen, Rogers, 12x3 ft.". Highest amount received for any single item was $10,055 for: "Item 1189 (last item sold)—Shovel, Type E Osgood, sr. 2841, yr. 1936, 6-cyl. gas Wisc. Shovel attachments complete. Shovel boom 18 ft. Shovel 1½ yd. with dipper stick. Amsco bucket No. A0685, 2 lights. Generator and air cleaner missing."

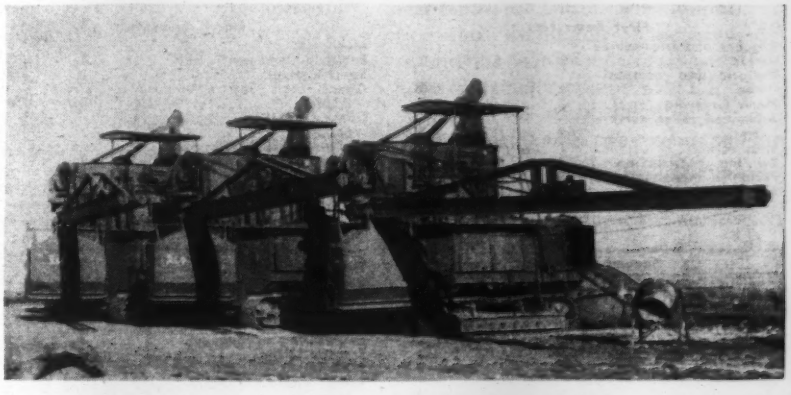
All transactions were cash, to be settled by the end of the sale by paying in cash, by money order or certified check. Some dealers made arrangements with a local bank for certified checks in the exact amount. Others carried certified checks from their home bank in various denominations and made up odd amounts in cash.

The sale was conducted and tabulated by a staff of ten under the direction of James G. Morris, surplus machinery section, U. S. Treasury procurement office in Kansas City.

The OPA was represented by Wm. A. Roe, of the Kansas City office. After the sale Mr. Morris declared he would not attempt to include farm machinery with construction equipment at future sales.



Scrapers with axles on the ground were a pathetic sight. The few equipped with tires were eagerly bid. For example, the two Gar Woods at extreme right sold for $556 and $1,776, without and with tires, respectively. The 14-yd. LaPlant-Choate at left, minus all rubber, was knocked down for $1,781.25.



Cleanest and best-looking machines in the lot were the big pavers. These three Foote 27E's were bid in at $1,750, $1,500 and $1,375, respectively, left to right.

Contracting and Other Practical Courses Offered by Missouri School of Mines

***Editor's Note**—For years the question of including courses in contracting in engineering curricula has been discussed by technical school authorities, but up to now no college seemed willing to take the first step. Now the Missouri School of Mines has included such training in a series of two-year subprofessional courses offered returning veterans and displaced war workers. The school officials have made this course, along with the others, available to regular students working toward a degree, so for the first time a contracting course becomes available to engineering students.*

IN COOPERATION with the Veterans Administration, the Missouri School of Mines at Rolla, Mo., has prepared a complete program of 26 special two-year technical end-courses to assist returning military personnel in finding regular employment in a postwar industrial world. Intended primarily as subprofessional courses conducted at college level, upon completion of which a certificate of proficiency rather than a degree is awarded, many of the more basic courses have been designed to fit into a four-year schedule, leading to a bachelor of science degree. With the cooperation of the Associated General contractors Association of Missouri, engineering construction and contracting has been made one of the basic courses. Thus, the school becomes the first in the country to offer a comprehensive course in construction contracting.

Five other courses have been outlined for the field of highway and airport design and construction. These are: (1) Design, construction and maintenance of highways and airports; (2) Surveying, mapping and photogrammetry; (3) Civil engineering geology; (4) Materials inspection and testing; and (5) Structural drafting and elementary design.

Other courses in the civil engineering field include training for sanitary and public health inspectors and sewage plant and waterworks operators. These are combined courses in that the first year's curriculum is identical for both. During the second year the student has the option of continuing in either the sanitary and public health inspection field or plant operation.

COURSE IN ENGINEERING CONSTRUCTION AND CONTRACTING

(Two years of two semesters each)

Subjects	Credit Hrs.	Lecture Hrs. Per Week	Lab. Hrs. Per Week
First Semester:			
Algebra and trigonometry	5	5	0
Rhetoric and composition	3	3	0
Plane surveying	2	1	3
Advanced plane surveying	2	1	3
Slide rule	1	1	0
Building construction	2	1	3
Personnel management	3	3	0
Industrial safety	2	2	0
Total	20	17	9
Second Semester:			
Analytical geometry	5	5	0
Report writing	3	3	0
General physics	5	4	3
Engineering drawing	2	0	6
Highway materials testing	1	0	3
Accounting	3	3	0
Metallurgical testing lab.	1	0	3
Total	20	15	15
Third Semester:			
Mechanics	5	5	0
Eng'g law and contracts	2	2	0
Specifications	1	1	0
Const. costs and estimates	2	2	0
Const. methods and planning	2	2	2
Equipment and performance	3	3	0
Geology	4	3	3
Seminar	1	1	0
Total	20	19	3
Fourth Semester:			
Structural design	4	2	6
Seminar	1	1	0
Soil mechanics	2	1	3
Foundations and earthwork	3	3	0
Engineering economics	3	3	0
Transportation	2	2	0
Materials	3	3	0
Mech. equip. in buildings	2	2	0
Total	20	17	9

The various courses in the program are to be maintained at college level and under the same academic rules and procedures used in regular college work. Entrance requirements are the same as those for regular students. Applicants who are deficient in entrance requirements may make up such deficiencies by doing work in residence.

The scope and quantity of work done in some subjects may not necessarily be equivalent to that required for a B.S. degree in the engineering department. However, if a student desires to change from the technical end-course program to a regular degree-granting curriculum, he will be able to do so without appreciable loss of time or credits. Likewise, a regular student may incorporate certain studies in the new courses into his schedule leading to a degree.

Course in contracting

Details of the curriculum in engineering construction and contracting are given in the accompanying table. Each of the two years is divided into two semesters. The first year is devoted to basic subjects, such as mathematics, English and report writing, physics, surveying, materials testing, and drawing. Special subjects are building construction, personnel management, safety and job accounting and cost keeping.

The second year schedule is largely special contracting subjects. Calculus, the customary second-year engineering mathematics course, is eliminated, but mechanics and structural design are offered to the extent they can be absorbed without a knowledge of calculus. Subjects related to contracting include engineering law and contracts, specifications, costs and estimates, methods and job planning, equipment and performances, soil mechanics, foundations and earthwork, engineering economics, materials and mechanical equipment in building. A one-hour seminar each week will be given over to lectures by outside en-

eers and construction contractors. A total of 20 credit hours is given each of the four semesters. Lec- hours per week vary from 15 to while laboratory hours run from 15 per week.

Other courses similar

The outline of all other courses is ilar to that of engineering con- ction and contracting, with basic eral subjects supplemented by spe- l studies in each particular field. the course in engineering inspec- n and tests all students the first r will take the regular schedule ered by the department of mechan- in materials inspecting and test- . Then, in the second year, spe- l courses will be offered, including rveying, drawing, stresses and framed structures, concrete, hydraulics, excavation, tunneling and blasting, soil mechanics, river and harbor engineering, bituminous materials and sanitation. Students also will delve into mechanical equipment of buildings, machine shop practice, foundations and earthwork, and the course is rounded out with attention to exposition and seminars in highway and airport engineering and construction.

The course in design, construction and maintenance of highways and airports offers the same basic studies given for engineering construction, plus 6 hours of chemistry. The special subjects, naturally, are devoted to highway and airport design, construction, and materials.

The course in surveying, mapping and photogrammetry is designed to include advanced aerial mapping and advanced topographic and mine surveying, supplemented with studies in geology and geography, photography, astronomy and photogrammetry. Differential calculus is offered as a second year study, along with light and optics.

These schedules are typical of all the courses, designed to give the student a working knowledge of his chosen field. They have been worked out by the various faculty members under the direction of Curtis L. Wilson, dean of the college. J. B. Butler, head of the civil engineering department, and E. W. Carlton, professor of structural engineering, outlined the course relating to civil engineering and construction.

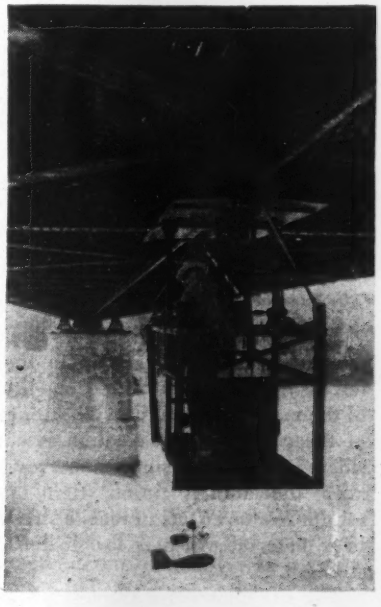
Gaging Car Suspended from Mississippi River Bridge

Henry C. Beckman,
District Engineer, U. S. Geological Survey, Rolla, Mo.

Flow of the Mississippi River at hebes, Ill., is measured from a gag- g car considered unique in that it suspended from a railroad bridge. he need for a permanent gaging ructure developed when the decision as made to obtain continuous ream-flow records at that point. Dis- harge measurements had been made eriodically from a motor launch. lowever, the services of two engi- eers and three or four technicians ere required, which together with he expense of moving the men and quipment to and from the site, was o costly to be expedient. Frequent ain schedules and many high-speed rains made it impracticable to work rom the railroad tracks; therefore, he suspended car was considered the ost feasible solution to the problem.

The car has a 3 x 7-ft. floor area nd more than 6 ft. of head room. It as possible to obtain the necessary eadroom because the unusually high ridge seats provided over 7 ft. of learance between the pier caps and low steel" of the bridge deck. A heet metal roof affords protection gainst cinders, dirt, and refrigeration rine from trains overhead. During he winter, sheet metal walls and cur- ains with windows may be added for protection against inclement weather.

The car travels along a 5-in., 10-lb. standard I-beam track suspended by steel angles from the floor stringers of the bridge. The I-beam was erected in approximately 8-ft. lengths with expansion joints coinciding with those in the superstructure. A 2,500-watt, 115-volt motor-generator set, mounted at the rear of the car, furnishes power for handling a 300-lb. sounding weight and for propelling the car along the track. The propelling force is derived from a ¼-hp. motor, operating through a reductor, and is transmitted to the driving wheel by a V-belt. The driving wheel has a 16-in. pneumatic tire that contacts the lower flange of the I-beam. For emergency use, this mechanism is supplemented by a hand crank with chain and sprocket drive.



Car operating along an I-beam suspended below Thebes, Ill., bridge provides an economical method of gaging Mississippi River flow.

The equipment has been in operation since April 1941, and discharge measurements have been made on an average of once every 4½ days. One engineer has been able to take an average set of soundings and velocity observations at 40 to 70 points in less than four hours. One-man operation and elimination of the necessity of moving equipment to the station have materially compensated for the original cost of installation.

The installation was made under the direction of Robert D. Schmickle, associate engineer, who at that time was in charge of the St. Louis office of the U. S. Geological Survey. Mr. Schmickle conceived the idea and made the original design, which was adopted with minor changes.

The gaging station is operated in cooperation with the St. Louis district of the Corps of Engineers, U. S. Army.

Oregon Highway Engineers Find...

Expansion Joints Unnecessary in Pavement

***Contents in Brief**—Comprehensive tests by the Oregon State Highway Department indicate expansion joints are not needed in concrete pavements, provided dummy joints are properly spaced. Conclusions are based on a three-year observation of two test sections of pavement.*

EXPANSION JOINTS in portland-cement concrete highway pavements in Western Oregon are unnecessary; in fact, they are a detriment to the smooth riding qualities required in a modern highway. Dummy (or contraction) joints, however, should be spaced at frequent intervals to relieve temperature stresses in the concrete. Moreover, expansion joints are planes of weakness in the pavement structure and as such, may shorten its useful life.

These conclusions are based on a comprehensive series of tests conducted during the past three years by the Oregon State Highway Department on two stretches of pavement containing various types of construction joints and subjected to actual traffic conditions. A full description of the tests is contained in the department's Technical Report No. 44-2.

Two-lane pavement tested

The two projects on which the tests were made include 6,000 ft. of two-lane concrete pavement constructed in 1940 near Salem on U. S. Highway 99E and a one-half-mile length of 22-ft. wide concrete pavement placed in 1939 on top of an old oil-gravel section of the Crater Lake Highway about 12 miles north of Medford, Ore.

Expansion joints of various types were built into the pavement on the project near Salem. Spacing of joints varied from a minimum of 30 ft. to a maximum of 495 ft. In addition, dummy joints were installed every 15 ft. After three years of service during which the daily traffic volume averaged 525 trucks and 3,205 other vehicles there are no indications of any pavement distress attributable to insufficient provision for expansion.

The concrete pavement on the Crater Lake Highway test section was placed in two 1,320-ft. sections without expansion joints, although dummy joints were placed every 15 ft. Here again there was no distress of any kind which could be related to a lack of room for expansion.

The length of the 1,320-ft. sections undoubtedly exceeds the critical length for any temperature effects, according to conclusions in the department's report, and a further extension of pavement length could not have increased the compressive strength occurring in the concrete slabs near the middle of each section.

Consequently, Oregon highway engineers are of the opinion that the length between expansion joints in a concrete pavement could be extended indefinitely without danger of failure by compression. This, of course, applies for climatic conditions and construction materials similar to those available in Western Oregon. Based on results of both test projects the engineers believe the complete elimination of expansion joints in concrete paving is both feasible and advisable, providing dummy joints are installed at 15 ft. intervals.

Compressive stress is low

Internal compression stresses due to temperature changes set up in these test sections did not exceed one-third of the maximum compressive strength of the concrete. Such action is considered beneficial since it serves to keep the dummy joints tight and minimizes the effects of tensile stresses in a material which is low in tensile strength.

The site chosen for the test project near Salem was located in rolling country with the pavement being built to a maximum grade of 4 percent. The 6,000 lin. ft. of pavement on this project was placed in two 11 widths, keyed at the centerline roadway and doweled with ½-in. reinforcing bars, 3 ft. long and spac 3½ ft. apart. The cross section of pavement was 9:7::7:9 in. throu out. (Fig. 2.) It was supported crushed rock and flanked with crush stone shoulders.

Expansion joints of five differ designs (Fig. 3) were install throughout the project, spaced at tervals of 30, 60, 120, 240, 428 a 495 ft. Dummy, or contraction join were installed every 15 ft. between pansion joints by inserting a ¼ x 2- premolded filler into the top surfa of the concrete soon after pouring.

Gage points grouted in slabs

The amount of opening and closi of expansion and dummy joints, d to temperature changes in the roa way pavement, was measured within 1/500-in. by special Ber strain gages operating in gage poin consisting of a $\frac{3}{32}$-in. hole drilled ¼-i deep in ⅜ x 2-in. bronze rods grout into holes drilled in the concrete.

The gage points were installed each side of every joint, 2 ft. fro one edge of the pavement. In addi tion, three pairs of gage points we set at each of the 21 expansion joint Thus there were four pairs of refe ence points at each expansion joi and one pair at each dummy joint. total of 437 pairs of gage points wa installed in the entire test project o U. S. Highway 99E.

Additional reference points, o markers, were placed opposite eac expansion joint, a short distance awa from the pavement on each side, t measure the longitudinal displace ment, or "creep" of the pavement rela tive to the ground. Measurement o this "creep" was by a transit set ove one marker, sighted on the marker o the opposite side of the pavement with careful measurements being made from this fixed transit line to the bronze gage points previously se in the pavements. These measurements

1. *Careful observation of a typical Western Oregon highway pavement indicates expansion joints are not required.*

e made to a tolerance of 1/200-in. record of temperature changes he concrete pavement was kept for in correlating actual pavement placement with theoretical elonga- and contraction. Temperature s were drilled at four locations in pavement, consisting of ¾-in. dia. es, 1 in., 3½ in. and 7 in. deep, in bottom of which was placed about . of mercury. Pavement tempera- s were taken by removing screw gs from these wells and inserting a rmometer in the mercury to get dings in the top, middle and tom of the slab.

Factors affecting movement

The absolute movement of expan- joint centers was determined by bining the measurements taken at fixed reference lines across the ement and the measurements taken oss the several joints. By record- temperature changes in the pave- t and comparing theoretical longi- inal displacement with actual meas- ments it was disclosed that certain ors other than warming and cool- contribute to the movements of pavement.

t was found that a slight downhill movement occurred after a service life of 2½ years in those sections located on an appreciable grade. No consistent relationship, however, was noted between the length of section between expansion joints and the magnitude of the "creep."

Expansion of concrete pavement also was found to be affected by moisture changes in the concrete or by a swelling of the concrete due to physical or chemical changes in the aggregate or mortar. Another variable factor was the friction between subgrade and pavement. It was difficult to separate these effects from horizontal displacement due entirely to temperature changes. The effect of temperature, however, is undoubtedly the predominant influence in horizontal displacement.

Interpretation of measurements

All concrete on the test project near Salem was poured in August, 1940. A slight opening of joints was observed throughout the following few months during which time there was about a 30-deg. drop in temperature. This was to be expected. Expansion joints closed at an even rate the following spring, reaching their maximum closure in July. Field measurements showed that average closure of joints was 0.24 in.

When cold weather set in during the fall and winter of 1941 the expansion joints opened but did not go back to their original position of the previous winter. The fact, the average opening was only 0.12 in. During the spring and summer of 1942 the joints again closed and exceeded the previous closure by 0.03 in. The winter of 1943 showed an average opening of joints of 0.06 in. less than the 0.12-in. average opening of the previous winter.

All this indicates a relatively rapid closure of expansion joints may be expected during the first season after construction, since most of the expansion between joints must be taken up by the slabs sliding along the subgrade. After this initial sliding has occurred, contraction of the concrete during the following winter opens the dummy joints without pulling the slab ends toward the center.

Expansion during the second summer is taken up by a closing of the dummy joints. Moreover, further movement of the expansion joints will occur only after the dummy joints

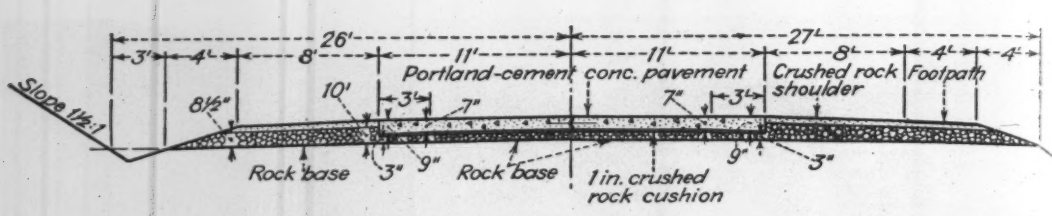


Fig. 2. One test section included over 6,000 lin. ft. of high-type pavement located on heavily traveled U. S. Highway

have closed. The dummy, or contraction, joints should take up virtually all expansion during the second and subsequent summers.

Only about one half of the dummy joints cracked open during the first winter but a combination of traffic stress and thermal action caused all of them to open during the second winter. The behavior of these joints indicates that although a 15-ft. spacing may not be the absolute maximum, it is recommended to be used as a reasonable factor of safety.

Effects of reinforcement

The effect of reinforcing steel on the spacing of dummy joints was determined in one 495-ft. section of pavement. Reinforcement consisted of ¼-in. round bars spaced 6 in. longitudinally and 12 in. transversely. No dummy joints were provided throu out the entire length of this sec of slab. Within three days after p ing the concrete, three transv cracks opened across the pave rupturing the longitudinal reinfo ment. The two closest cracks 77 ft. apart. No other cracks veloped during the first year but additional cracks 57 ft. apart veloped during the second year. sults of this investigation indi that dummy joints should be spa not farther apart than 50 ft. when the pavement is reinforc Whether the cost of the reinforcem is worth the advantages gained problematical.

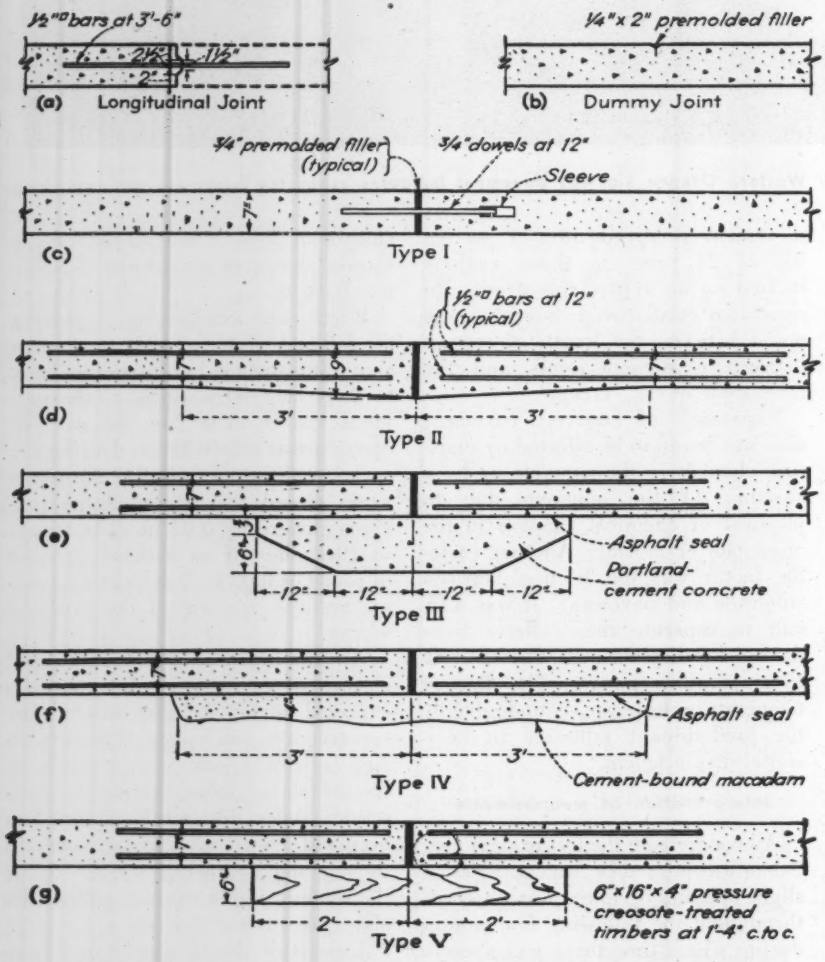


Fig. 3. Five types of expansion joints were tested for slab movement, deflection and load-transfer properties. A doweled construction joint (a) was located on the centerline of pavement, and dummy joints (b) were spaced 15 ft. apart throughout the pavement.

Vertical displacement at joints

Some very interesting data w secured on the rigidity and lo transfer capacity of the various t of expansion joints (Fig. 3) instal in the test pavement near Salem. Jo Type I has been in general use Oregon highway construction for s eral years. Dowel bars extend through this joint are greased for half of their lengths, with the e sliding in a cap sleeve.

Joint Types II, III, IV and V w installed under two conditions; re forced as indicated in Fig. 3, and reinforced but of the same dim sions. Chief purpose in all cases to strengthen the pavement slab at joint to improve its load-transfer pacity.

After three years of service cracks have developed adjacent to nonreinforced joints, nor in the re forced slab ends. This indicates str concentrations at the edges of rigid joint support are not seri enough to warrant the expense of reinforcement.

Differential vertical displacemen at the several joints were measured a special displacement meter. (F 4.) This instrument was made up o steel bar and sensitive level bub operating on a three-point support

side of the joint while the end of bar was equipped with an Ames so arranged as to measure the ical movement under a truck load he adjoining pavement.

Comparison of joints

ertical displacements of the slab at the various expansion joints measured under a 20,000 lb. load. Results of these tests wn in the accompanying table) cate that the Type III joint with crete sill could be substituted for doweled joint, Type I, with an ease in joint rigidity. Oregon way engineers are of the opinion the cost of installation of the e III joint would be less than for doweled joint, particularly where sit-mix or central plant-mixed crete is used on the job.

s might be expected, the treated er supports of the Type V joint vided inadequate support for the ement end. Similarly, Type II t gave relatively poor support e its resistance to deflection de- ds entirely on the stiffness of the . The relatively poor support af- ed by Type IV joint, with the ent bound macadam sill, was er surprising, as it is essentially same as Type II except for the lity of the supporting sill. Ap- ently some crushing of the mac- m occurred under the truck load. dummy joints were found to be roximately as rigid as the stand- expansion joint Type I.

Crater Lake project

o expansion joints were installed he 2,640-ft. test pavement installed the Crater Lake Highway near dford, Ore. This concrete was ed in two 1,320-ft. lengths sepa- d, however, by a 4-in. joint filled oiled gravel. Dummy joints were alled every 15 ft. with provisions le for measuring the longitudinal

LECTION OF JOINTS UNDER 20,000 LB. AXLE LOAD

Deflection in Inches

Nonreinforced		Reinforced	
Edge	Center	Edge	Center
0.0042	0.0047		
0.0095	0.0150	0.0085	0.0141
0.0016	0.0020	0.0008	0.0007
0.0080	0.0050	0.0050	0.0027
0.0093	0.0079	0.0075	0.0061
mmy Joint 0.0055			

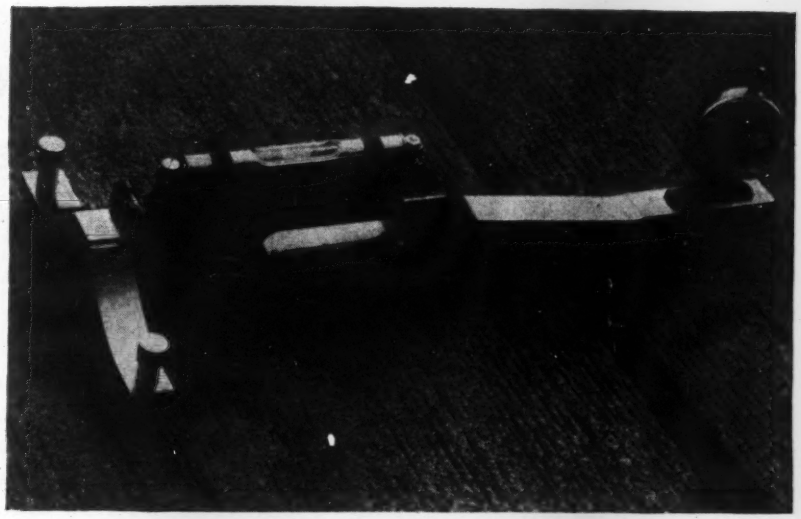


Fig. 4. Vertical displacement of adjacent pavement sections under a 20,000-lb. axle load were measured with a displacement meter to determine the load-transfer property of the expansion joints.

movement of the concrete at these joints, the same as in the test pavement near Salem.

Three kinds of concrete were used on this project, designated as 3-, 4- and 5-sack mixes per cubic yard. The slump of the concrete varied between ½ and 1 in. As mentioned before, this 8-in. thick, 22-ft. wide concrete slab was placed over an old oil-gravel mat on a gravel subbase. A sand cushion was used to bring the oiled surface to an even grade prior to placing the concrete.

One significant fact disclosed in this experiment was that shrinkage of the concrete increases with an increase in cement content. Both the 4- and 5-sack mixes showed considerable more shrinkage than did the 3-sack concrete. The rate of increase in opening of cracks formed at or along the dummy joints also increased with the cement content of the concrete. This may be due to the lower modulus of elasticity of the leaner mix and its ability to better absorb longitudinal displacement due to temperature changes, by deformation within itself.

Engineering personnel

All experimental work on the two test projects was carried out under the supervision of R. H. Baldock, state highway engineer, Oregon State Highway Department, assisted by C. B. McCullogh, assistant state highway engineer, and Glen S. Paxon, bridge engineer. H. G. Smith, construction engineer, F. D. Eason, division engineer and Hedda Swart, resident engineer were in charge of the work, assisted by Kenneth Mackenzie, Kehn Waln and Richard Rosecrans, all of the highway department. N. M. Finkbiner, materials engineer, was in charge of the laboratory work in connection with the experiments.

The department's Technical Report No. 44-2, from which this discussion was secured, was prepared jointly by Glenn S. Paxson, bridge engineer and Carl P. Richards, assistant research engineer.

Recommended Standard For Prefabricated Homes

In cooperation with the Prefabricated Home Manufacturers' Institute, Washington, D. C., the National Bureau of Standards has prepared a standard for prefabricated homes. The document covers structural strength of the various component parts, requirements for light and ventilation, and recommended requirements for foundations, chimneys, heating, plumbing, insulation, and electrical wiring. It includes general requirements for material, workmanship as provided by the manufacturer, site erection and assembly of prefabricated units, and protection during transportation and erection.

Copies of the complete standard may be obtained from the National Bureau of Standards, Washington.

Determination of Surface Moisture In Fine Aggregate

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Engineer, Central Concrete Laboratory,
Corps of Engineers, U.S.A., Mount Vernon, N. Y.

***Contents in Brief**—Method for determining surface moisture in sand in as little as two minutes involves introducing a sample, whose weight is equal to 500 times the bulk specific gravity, into a 1,000-ml. container, filling the container with water and weighing. From the net weight of the contents, surface moisture can be read directly from a table whose values are based on the fact that a given volume of sand and water, which always contains the same weight of moist sand, will decrease in weight progressively as the amount of surface moisture in the sand increases.*

A NEW METHOD for the determination of the percentage of surface moisture in fine aggregate has recently been adopted by the Central Concrete Laboratory of the Corps of Engineers and is here presented in the belief that it may be of practical value to persons and agencies responsible for the control of concrete mixtures in the field. The method requires relatively simple, rugged equipment and enables determinations to be made in the field with satisfactory accuracy in not more than two minutes of operating time.

The most useful and rapid methods for determining the amount of face moisture in fine aggregate pend on comparisons of the we volume relation (specific gravity the moist material with that of same material in the saturated face-dry condition. C. R. W (*ENR* March 9, 1944, vol. p. 341) proposed a simple and adap method based on this principle.

The method is based on the that a given weight of moist will contain progressively less sand as its surface-moisture co increases. Consequently, *a spec volume* of sand and water, whic ways contains the same weigh moist sand, will *decrease in we* progressively as the amount of face moisture in the sand incre By making the specified weigh moist sand a function of the specific gravity (s.s.d. or satur surface dry) of the material and volume of the container, the perc age of surface moisture may be directly from a table giving bulk cific gravity (s.s.d.) and combi weight of the specified volume of sand-water mixture.

Mr. Waters proposed the use 2-liter container and a sample we ing 1 kg. times the bulk specific g ity (s.s.d.), and prepared his t accordingly. He also proposed use of a metal straight-edge to st off the filled container. This met has been tried in the laboratory with certain modifications of ap atus and procedure, has been fo excellent for field use. The full det are given at the left.

The operation of the method mi in some cases be facilitated by following modifications of the eq ment and procedure outlined: The balance may be equipped w a funnel-nose scoop pan. (2) The of an 8½ by 12-in. aluminum scoop

FIELD METHOD DETERMINATION OF SURFACE MOISTURE IN FINE AGGREGATE

Scope: This method of test covers a rapid procedure for determining the percentage of surface moisture in fine aggregate.

Apparatus: The apparatus shall consist of: (1) A cylindrical metal container whose height is approximately equal to its diameter and which has a capacity of 1000 ± 1 ml.; (2) a plate-glass cover plate of sufficient size to cover the container; and (3) a balance, preferably of the torsion type, having a capacity of 4 kg. or more, and graduated to 0.1 g. or less.

Sample: A sample, weighing approximately 2 kg., shall be selected which shall be as truly representative of the fine aggregate as possible. It shall be well mixed and covered in such a manner as to reduce losses from evaporation to a minimum.

Procedure: (a) This method requires that the bulk specific gravity of the saturated surface-dry (s.s.d.) fine aggregate be known. Determinations may be made according to A.S.T.M. C 128.

(b) Approximately 400 ml. of water and 2 drops of caprylic alcohol shall be introduced into the container. A quantity of the sand equal to 500 times its bulk specific gravity (s.s.d.) shall be weighed out to the nearest 0.1 g. and introduced into the container. Additional water shall then be added to the container until it is filled to capacity. The glass cover-plate shall then be slid onto the top of the container in such a manner that no air bubbles are trapped beneath it. The container shall then be wiped off and weighed to the nearest 0.1 g. The weighing pan shall be dry and clean during the weighing operation.

Calculation: The percentage of surface moisture shall be determined, from the net weight of sand and water in the container, by the use of the accompanying table. Field determinations should check within ± 0.2 percent of surface moisture.

Percentage of Surface Moisture in Fine Aggregate	Bulk specific gravity (saturated surface-dry)									
	2.59	2.60	2.61	2.62	2.63	2.64	2.65	2.66	2.67	2.68
	Combined weight in grams of sand and water									
0.0	1795.0	1800.0	1805.0	1810.0	1815.0	1820.0	1825.0	1830.0	1835.0	1840.0
0.5	1791.0	1796.0	1801.0	1806.0	1811.0	1816.0	1821.0	1826.0	1831.0	1836.0
1.0	1787.0	1792.0	1797.0	1802.0	1807.0	1812.0	1816.5	1821.5	1826.5	1831.5
1.5	1783.0	1788.0	1793.0	1798.0	1802.5	1807.5	1812.5	1817.5	1822.5	1827.5
2.0	1779.0	1784.0	1789.0	1794.0	1798.5	1803.5	1808.5	1813.5	1818.5	1823.0
2.5	1775.0	1780.0	1785.0	1790.0	1794.5	1799.5	1804.5	1809.0	1814.0	1819.0
3.0	1771.0	1776.0	1781.0	1785.5	1790.5	1795.5	1800.0	1805.0	1810.0	1815.0
3.5	1767.0	1772.0	1777.0	1781.5	1786.5	1791.5	1796.0	1801.0	1806.0	1810.5
4.0	1763.0	1768.0	1773.0	1777.5	1782.5	1787.0	1792.0	1797.0	1801.5	1806.5
4.5	1759.0	1764.0	1769.0	1773.5	1778.5	1783.0	1788.0	1792.5	1797.5	1802.0
5.0	1755.0	1760.0	1764.5	1769.5	1774.0	1779.0	1783.5	1788.5	1793.0	1798.0
5.5	1751.5	1756.0	1760.5	1765.5	1770.0	1775.0	1779.5	1784.5	1789.0	1794.0
6.0	1747.5	1752.0	1756.5	1761.5	1766.0	1771.0	1775.5	1780.0	1785.0	1789.5
6.5	1743.5	1748.0	1752.5	1757.5	1762.0	1766.5	1771.5	1776.0	1780.5	1785.5
7.0	1739.5	1744.0	1748.5	1753.5	1758.0	1762.5	1767.0	1772.0	1776.5	1781.0
7.5	1735.5	1740.0	1744.5	1749.5	1754.0	1758.5	1763.0	1767.5	1772.5	1777.0
8.0	1731.5	1736.0	1740.5	1745.0	1750.0	1754.5	1759.0	1763.5	1768.0	1773.0
8.5	1727.5	1732.0	1736.5	1741.0	1745.5	1750.5	1755.0	1759.5	1764.0	1768.5
9.0	1723.5	1728.0	1732.5	1737.0	1741.5	1746.0	1750.5	1755.5	1760.0	1764.5
9.5	1719.5	1724.0	1728.5	1733.0	1737.5	1742.0	1746.5	1751.0	1755.5	1760.0
10.0	1715.5	1720.0	1724.5	1729.0	1733.5	1738.0	1742.5	1747.0	1751.5	1756.0

take the sample would provide a sufficiently large volume of sand to permit continuous loading of the balance pan. (3) For a series of determinations on the same material, where the bulk specific gravity (s.s.d.) and hence the sample weight will remain constant, apparatus could be devised which would automatically take a sample of the proper weight and introduce it into the container. The container could then be filled, struck off, and weighed on a direct-reading balance, which could be graduated in percentage of surface moisture.

To estimate the probable degree of accuracy of the modified method, sands, differing widely in source, type, and specific gravity were tested in various surface-moisture conditions, and an average deviation of 0.19 percent was found between the actual surface-moisture and the value determined by the test.

The basic formulas involved in this method were published in the letter of Prof. E. E. Bauer (*ENR* May 18, 1944, vol. p. 726) and hence are not reproduced since their use is not required in the determination.

Graphical Selection of Open Channel Dimensions Using $Ar^{2/3}$ Charts

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Stanley Engineering Company
Muscatine, Iowa

The selection of the proper size of open channel, frequently involving comparisons of various alternative cross section, can often be simplified by the use of charts showing the values of $Ar^{2/3}$ for various shapes and dimensions of channels. The Manning formula,

$$Q = A \frac{1.486}{n} r^{2/3} s^{1/2} \qquad (1)$$

where Q is the flow in cfs, A the channel area in square feet, r the hydraulic radius, s the slope and n the coefficient of roughness, may be rewritten:

$$Ar^{2/3} = \frac{Q}{\left(\frac{1.486\, s^{1/2}}{n}\right)} \qquad (2)$$

Often the slope of the open channel is fixed to topographic or other controlling elements, and usually a given value of s will apply for the range of cross sections considered. Then the denominator of the right side of equation (2), $\left(\frac{1.486\, s^{1/2}}{n}\right)$ becomes a constant, k, and the required value of $Ar^{2/3}$ for any condition of flow is:

$$Ar^{2/3} = \frac{Q}{K}$$

The values of $Ar^{2/3}$ are easily computed from the geometric functions of the cross sectional shapes considered. For a rectangular section having a width b and a water depth d,

$$Ar^{2/3} = bd\left(\frac{bd}{2d+b}\right)^{2/3}$$

By computing $Ar^{2/3}$ value for a few widths and depths a series of curves may be readily plotted.

The use of this chart is illustrated by the following example. Let Q = 4000 cfs, s = 0.01 and n = 0.013. Using formula (2)

$$Ar^{2/3} = \frac{4000}{\left(\frac{1.486 \times 0.01^{1/2}}{0.013}\right)} = 350$$

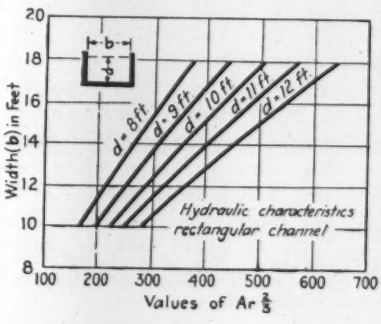
From the drawing the following dimensions of rectangular channels will give the required value of $Ar^{2/3}$.

Depth	*Width*
12	11.6
11	12.6
10	13.7
9	15.2
8	17.0

These various cross sections, all of which meet the hydraulic requirements may be compared as to economics, adaptability to topography and other desired factors which are to be considered in the design.

Obviously, similar charts may be prepared for channels of any shape—square, triangular, trapezoidal, semicircular, or combination thereof. Anyone familiar with the hydraulic properties of sections can readily make these calculations and prepare charts to fit the shapes and ranges of sizes under consideration.

This method of analysis has been used on several design problems and has been both convenient and time saving. It can also be used to graphically demonstrate the result of contemplated modification of channel shape and dimension.



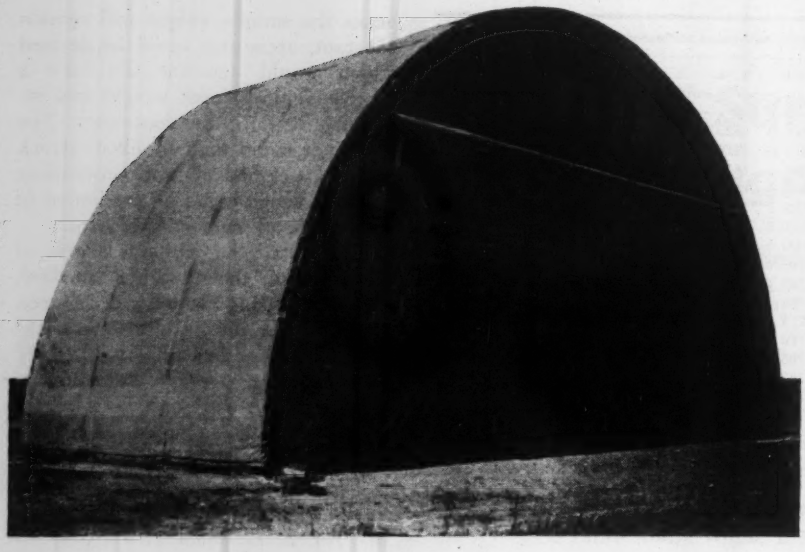


Fig. 1. Designed to require a minimum of shipping space, and to withstand an 80-mph. wind, this Navy "nose-in" hangar has steel I-beam arches. A canvas cover "floats" on the steel framework in a manner to eliminate high local stresses in the fabric. A 50-mph. wind was blowing when the picture was made.

Portable "Nose-In" Hangar Of Steel and Canvas

Contents in Brief—A demountable hangar, designed for rapid erection without the use of cranes or scaffolding, and requiring a minimum of shipping space has been developed by the Navy. Known as a "nose-in" repair dock, the structure has identical steel arches composed of 8-ft. lengths of I-beams, all rib segments being interchangeable. A special fabricated canvas cover that "floats" on the steel framework provides a weather-tight enclosure. The hangar will shelter the engines and nose sections of the largest sea and land aircraft of the Navy. Overhead crane hoists and ways are available for rapid repair and maintenance work.

A DEMOUNTABLE, steel-frame hangar, 30x78 ft., which can be erected in 300 man-hours without the aid of cranes or scaffolding, has been developed by the U. S. Navy for aircraft maintenance. The structure is especially valuable for operations in the war zones because overhead cranes are provided to permit heavy repair work. The hangar is further distinguished by its light weight, by a "floating" laminated-canvas cover considered one of the most durable fabrics developed during the war for outdoor use, and by the small shipping space the hangar requires.

The structure is used as a "nose-in" hangar to shelter the engines and nose of the aircraft while the wings and tail end of the plane are left exposed to the weather. Designed to withstand an 80-mph. wind and for use in temperatures as low as 40 deg. F. below zero, the hangar is of sufficient size to accommodate the largest land and sea aircraft of the Navy, including the PB2Y plane. Aircraft are accommodated at either end; if work on a four-motored plane is being done at one end of the hangar, then a two-motored aircraft may be accommodated at the other end. The draw-string "socks" provided in the canvas end curtains (Fig. 2) to enclose the engine nacelles and fuselage may be shifted quickly when necessary, while these curtains, which are supported at the top on rollers for convenient doorings, may be rolled back to provide a 26x55-ft. opening at either end, if this is desired.

Principal framing of the hangar, which is dip galvanized steel, consists of arch ribs of 76-ft. span and 38-ft. rise. Spaced 9 ft. 8 in. on centers, the arches are made up of 8-ft. lengths of 14-in., 30-lb. wide-flange beams. To reduce the weight of the ribs, about 40 percent of the web of the beam (Fig. 3) is punched out; the resulting holes eliminate the need for erection scaffolding, as they permit the workers to climb rapidly up and down the arches.

Bracing between adjacent ribs consists of a horizontal channel strut at each joint along the arch and ⅜-in. dia. wire cable diagonals. Added bracing is provided 26 ft. above floor level by a horizontal truss framing that also supports two overhead cranes each of 4,000-lb. lifting capacity; these cranes are very important for heavy aircraft maintenance work, as they eliminate the need of sending damaged aircraft to rear bases for repair.

Steel shoes, as shown in Fig. 3, are placed directly on the foundation soil to support the arches. Each shoe is held in place by four 1¼-in. dia. pins 5 ft. long. The ribs are made into a tied arch by joining the two shoes of a given rib with a ⅜-in. dia. wire cable tie.

Cover "floats" on framework

Several hangars designed in the past for use in war zones by the United States armed forces have been equipped with a canvas covering supported by steel cable catenaries or suspended from a structural steel framework. Both these methods of support generally make the canvas vulnerable to wind damage, and the fabric usually has a short life. In contrast, the canvas covering for the structure here described "floats" on the framework in a manner eliminating concentrated local stresses in the

fabric. This method of support, which results in long life for the material, permits the cover to carry a moderate snow load and to withstand strong winds.

After much study and experimental work a strong mildew-proof, fire-resistant, water-repellent, wind-proof laminated canvas cover for the hangar was developed. The fabric consists of two layers of No. 12 (8.95 oz. weight) duck bonded together with a synthetic rubber, the rougher surface of each layer being exposed. When the resulting material was tested it withstood a hydrostatic pressure of 450 psi., while a bag made of the fabric remained inflated at a 25-psi. pressure for 12 hr. without an appreciable air loss.

Canvas doors, as shown in Figs. 1 and 2, are used to close the ends of the hangar, the canvas being braced against wind pressure by detachable cables passing through "tunnels" sewn to the canvas. Two smooth timber rub rails attached to each rib and projecting a few inches beyond the upper flange of the arch form a smooth arc and prevent the roof canvas from coming in contact with the steel framework, an important factor in the life of the fabric. A wire cable placed between the two rails and outside of the cover is tightened to secure the canvas in place along each intermediate arch. This method of support eliminates high local stresses in the fabric, by giving it continuous support and restraint, which further increases the life of the cover.

Where the canvas panels meet, a carefully designed lapped joint with key and becket lacing is used to make the enclosure almost air tight. As a result, by means of a special heater that provides for recirculation of the enclosed air, the hangar may be used to provide a comfortable temperature for maintenance and repair of aircraft engines with the outside temperature as low as 40 deg. F. below zero.

The structure was designed for air transportation of the necessary materials in 500-lb. bundles, which is about the heaviest unit readily handled manually. Since the heaviest individual piece of the hangar weighs only 300 lb., bundles weighing less than 500 lb. are easily prepared. The total weight of the materials for a 30x78-ft. hangar is but 23.4 tons, and the total required shipping space is only 809 cu. ft. For shipment the steel is bundled, and the canvas rolled and placed in "chafing" bags, while the small parts are boxed. Extra parts are sent along for use in case of damage to the hangar by enemy action.

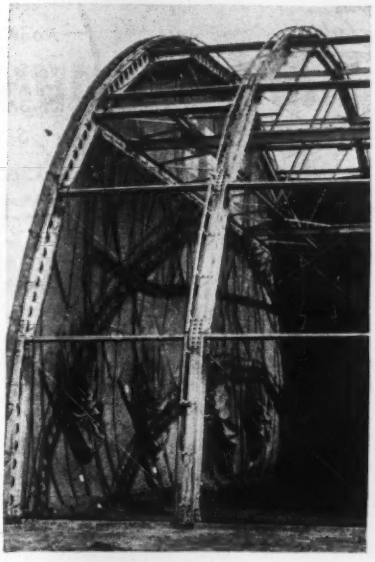


Fig. 2. Ribs are assembled from 8-ft. lengths of steel I-beams, all sections being interchangeable to permit rapid erection. On their inner surfaces end curtains are equipped with tunnels to accommodate small vertical cables providing lateral support for curtain.

Rapid erection is possible

A minimum crew of 16 men, without the aid of a crane, is able to assemble the arches and erect the structure in two days, including addition of the canvas cover. Erection may be much more rapid with the aid of a crane.

Nearly 60 percent of the assembly work is done on the ground. All the arches are identical and all the beam sections are interchangeable, which permits rapid assembly. The four arches are fully assembled and attached to the steel shoes with hinge pins before erection of the ribs is begun. They are then raised one at a time.

When a crane is not available for erection purposes, a single telescoping gin pole and a block and tackle is used to raise the arches. The blocks are generally operated with power from a truck, but they can be operated manually.

First section of the canvas enclosure to be placed is that for the gables. Erection of the end curtains

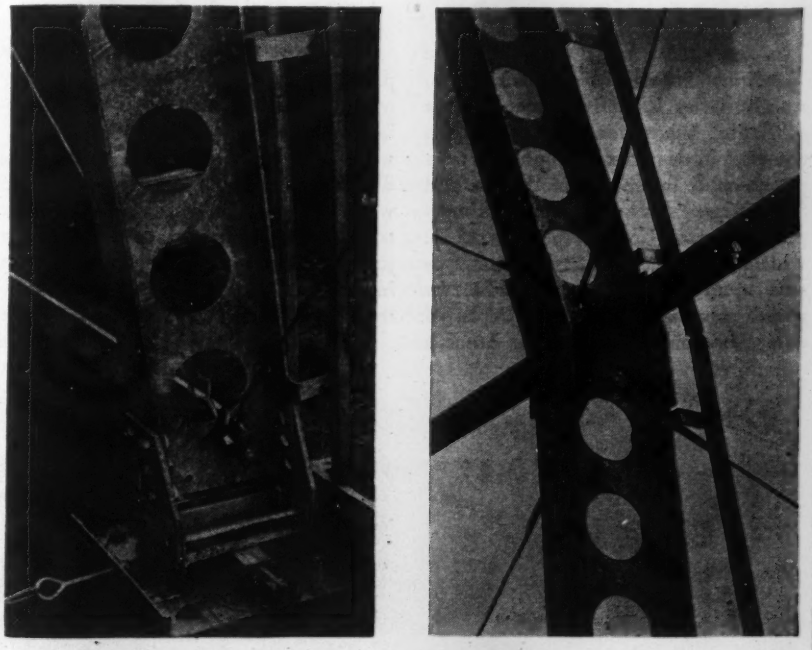


Fig. 3. Ribs at ground level are bolted to shoes placed directly on bearing soil and equipped with anchor pins, the two shoes of a given arch being joined by a ⅝-in. dia. cable tie. Right: To outer flange of each arch two wood rub rails are attached to keep canvas cover from coming in contact with metal framework. Simplicity of joints is illustrated.

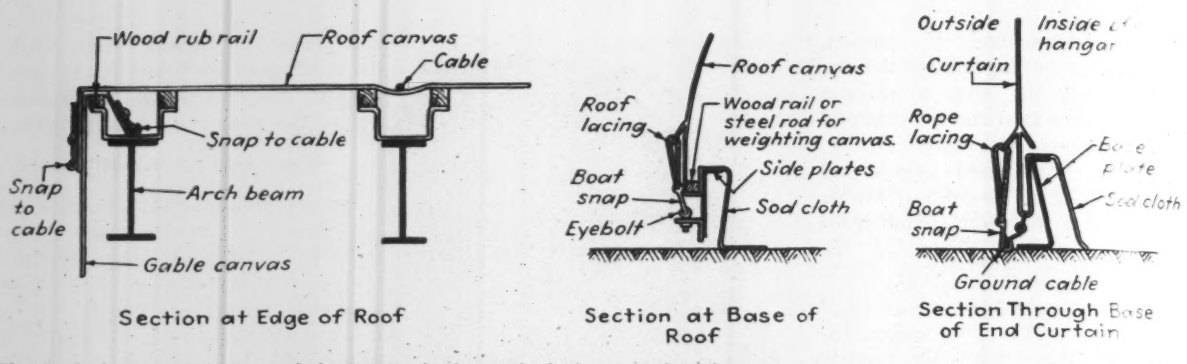


Fig. 4. An important feature of the hangar is the method of supporting the canvas cover to make the enclosure weather-tight at ground level and along the edge of the roof. The design not only accomplishes this purpose but eliminates wear between canvas and metal, thereby greatly increasing the life of the fabric.

containing the "socks" follows, and finally that over the arch ribs, which is delivered in three 30x30-ft. squares. The first square for the roof is raised in the form of a roll to the crown of the ribs, and after being snapped to the cable lacing at the ends of the hangar the canvas is allowed to roll down the arches to either side. Addition of a bottom square at each side completes the enclosure.

It should be pointed out that the hangar may be made any length desired by adding additional arch ribs, no special parts being needed. This feature of the structure, coupled with the fact that the canvas cover may be replaced with a permanent roofing material, has permitted the hangar to be used in the war zones for several purposes in addition to that originally planned. These several uses would indicate that the structure may find wide application in the postwar period.

The hangar was designed for the maintenance branch, aircraft maintenance division, Bureau of Aeronautics, U. S. Navy. Capt. E. W. Clexton is head of the division, and Comdr. R. E. Combs is head of the branch, while Lt. Comdr. Homer T. Bogle was in charge of the extensive experimental work carried out before the final design was approved and accepted. The International Derrick and Equipment Co., Columbus, Ohio, with Charles C. Anthony in charge of their Washington district offices, worked out the design details and manufactured the hangars. New Castle Products Co., New Castle, Ind., as a subcontractor, assisted in designing the canvas cover, and fabricated it.

Rooter Plows Cable Trench 7 Ft. Deep

A huge rooter, weighing 15 tons, was built by Post Bros., contractors of Santa Ana, Calif., for opening a trench 7 ft. deep for laying a new telephone cable between Los Angeles and San Diego. According to the Caterpillar Tractor Co., the plow is 12 ft. wide and 10 ft. high, riding on two steel tread wheels. It is pulled by two diesel tractors in tandem. Depth of cut is controlled by a cable from a power control unit on the rear tractor operating through a massive triangular plate link system connecting the wheels to the main frame. Although designed as a dual purpose machine with a slotted blade for cutting the trench and laying the cable, on this job the plow is used solely for loosening the soil in the line of the proposed trench because of the depth of the cut.

Cable laying is by a following train of equipment, consisting of two pulling tractors, a cable layer on pneumatic tires that plows through the loosened trench soil and buries the cable, a cable reel carrier on crawler treads, and a pusher tractor operating in reverse dragging a bulldozer blade that covers the trench and smooths the top soil.

The outfit was assembled in a hurry and the job is being rushed to completion to relieve the war-born telephone congestion now obtaining in the southern California area.

Big 15-ton rooter plows a trench 7 ft. deep for new West Coast telephone cable. At right, the train of cable-laying equipment, a laying machine and reel carrier pulled by two tractors and pushed by a third in reverse, which drags a bulldozer that closes and smooths off the trench.

Bolts in Multiple-Timber Joints

Charles Mackintosh
Structural Engineer, Mackintosh & Mackintosh
Los Angeles, California

***Contents in Brief**—An analysis is presented of one of the most common problems facing the timber designer—determining bearing value of bolts of different sizes through multiple member joints with loads in several directions. Use of fewer and larger bolts in such joints is indicated.*

Recently published recommendations of procedures for the design of multiple member joints cover the condition of adjacent members being oppositely stressed.* There are other types of joints that are not shown in the existing literature although they are very commonly used. For instance, if each of several members at a joint has a force in a different direction, the joint may still be quite satisfactory, as long as the total components of force in any direction balance each other.

The designer of timber structures is continually confronted with the necessity of analyzing the type of joint illustrated in sketches (b) and (c) where the vertical component of force of a central timber may be opposed by an opposite force in the outside timbers. The intermediate members either transfer load or act simply as independent filler blocks.

In sketch (c) the members are at an angle to each other; some members are horizontal, some vertical and some diagonal. To make the joint both sufficiently strong and completely practical the designer must be able to determine the value of a bolt of a given size when installed in a joint of this type. The analysis of a simple joint is presented to provide a satisfactory illustration.

In the simpler case (b in the sketch), it is quite obvious that if the bolt is of small diameter and unable to resist bending, the load must be carried by it from the side members into the filler blocks and then out again from the fill blocks to the central member. A very flexible bolt will act much as nails would act in carrying the loads from the outside members into the intermediate members, which might then transfer the loads in a similar way to the central member.

If the bolt is of large diameter, inflexible and fully capable of resisting the bending imposed upon it, this stiff bolt will carry the load directly from the outside members to the central member and the intermediate fillers will carry no stress. Thus if a large bolt is used, the forces from all the members are resolved into the one bolt. This bolt will take all of the bending forces caused by the loads being applied along its length and, if the exterior loads are balanced in space and symmetrical or in static equilibrium, the joint itself will be satisfactory and the large bolt will have no tendency to overturn.

The large bolt will provide a distinct advantage over the flexible bolt because the allowable bearing of each timber upon the large bolt is in every case, full "double-shear" end-bearing upon the full thickness of the member involved. On the other hand, the thin flexible bolts must transfer the load into the intermediate members at the low bearing values of wood normal to the grain. As the bolt diameter is decreased the allowable load values drop off rapidly. Between the two extremes there is a region where the intermediate members aid the deflecting bolt in carrying the load.

An analysis of the joint b is presented in the accompanying table. The values shown apply to seasoned Douglas fir or Southern yellow pine. The ½ in. dia. bolt is so flexible that most of the load is carried in side grain bearing into and again out of the intermediate members. When an intermediate member has shear applied in one direction on one face and equal shear applied in the opposite direction on its opposite face, it does not at present appear that the safe value for this condition need be less than one-half of the value that may be used when the loads on both faces are in the same direction.

*National Emergency Specifications for the Design, Fabrication and Erection of Stress Grade Lumber and its Fastenings for Buildings, War Production Board Directive No. 29, Aug. 1943.

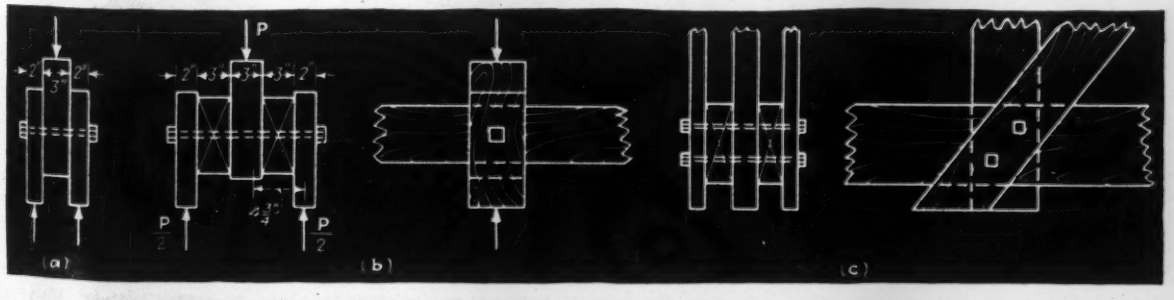


Fig. 1. Multiple-member joint strength depends on inflexibility of the bolt as well as the lever arm between stresses.

TABLE I—BEARING VALUE OF VARIOUS SIZE BOLTS IN JOINT OF FIG. 1(b), IN STRUCTURAL TIMBER

Values in Cols. 3-6 may be increased as recommended in National Emergency Specifications for the Design, Fabrication and Erection of Stress Grade Lumber and its Fastenings for Buildings, W.P.B. Directive No. 29, dated Aug. 1943. All bolts are assumed to be in holes of same diameter and tightened snug.

Col. 1	2	3	4 *	5 **	6
Bolt diameter	Bolt section	* End bearing of three member joint	½ value side bearing one 3-in. member	½ value of bolt at yield using 4¾-in. arm	Approximate safe load
inches	modulus	lb.	lb.	lb.	lb.
½	.0123	1048	346	116	346
¾	.0414	2165	436	392	600
1	.0982	3089	524	930	1340
1¼	.1920	3892	613	1819	2330
1½	.3314	4680	705	3140	3650
1¾	.5265	5460	795	4988	5250
2	.7852	6240	883	7439	6240

* See convenient bolt tables in Supplement No. 1, Douglas Fir Use Book, West Coast Lumbermen's Association, 1937.
** Assumes bolts having a yield point of 45,000 lbs. per sq. in.

Bolts of larger than ¾ in. dia. will safely carry more load in bending, see Column 5, than may be transferred in side-bearing by the intermediate fills under the assumption stated in the previous paragraph. In computing Column 5 a lever arm of 4¾ in. was used throughout. This is correct for the larger bolts but is too large when the force from the bolt is resisted near the face of the center timber, and it may be reduced still more if the exterior timbers are capable of resisting eccentricities.

The values of Column 6, then, are somewhat larger than the values of Column 5 for the intermediate sized bolts for two reasons—the intermediate members assist the bolt somewhat; and the actual distribution of bearing stress on these bolts is such that the moment arm is somewhat less than the 4¾ in. used in Column 5. The values of Column 6 also must be not less than Column 4 and not larger than Column 3 in which the value of the joint is limited by the bearing value of the bolt against the end grain of the 3 in. center member. The intermediate timbers act purely as spacers or fill blocks.

In the example in the table it is evident that four ¾ in. bolts would be required to replace one 1¼ in. bolt. The engineer may reasonably conclude that one larger bolt will usually be selected in joints of this type in preference to two or more smaller bolts if other conditions permit.

The approximate safe load to be resisted by a bolt in the joint of sketch c may be analyzed in a similar manner but with the added problem of combining the effects of the vertical and horizontal components of the forces of the members.

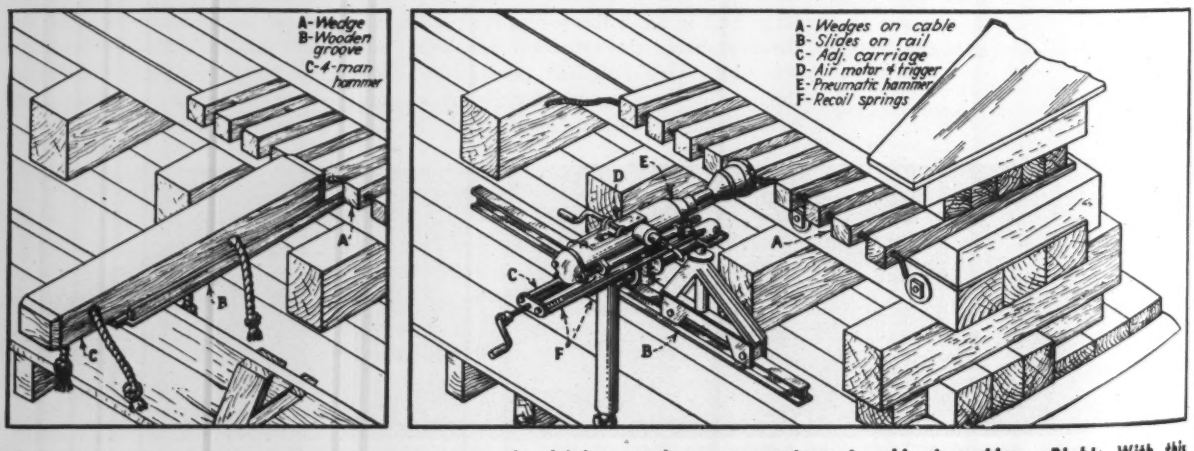
Pneumatic Ram Drives Wedges

Wooden wedges that have to be driven, in preparations for a ship launching, between the wedge riders and the sliding ways, were formerly driven into place at the Vancouver yard of Kaiser Co., Inc. by use of a 6-ft. timber ram. The timber was set up, horizontally, in a greased trough with four ropes attached. It was made to function by four operators who used the ropes to drive the timber against the wedge. As about 1,000 wedges have to be driven for each launching this method was slow and costly.

The work is now done mechanically with a pneumatic hammer adapted to function as a ram with a 16-in. stroke. Its carriage runs on a track extending the full length of the ways on either side.

The track is an I-beam on which rollers operate between the flanges, thus preventing the impact of the ram from knocking the rig off its supports. A second support near the opposite end of the ram is also mounted on a caster. This makes it possible to move the entire rig quickly from one wedge to the next. The operator has controls so conveniently arranged that he can move the machine into position and drive wedges at the rate of eleven per minute.

The pneumatic rig was suggested by Kenneth Hunter, shipwright superintendent, and Fred Schlotfeldt, who is the yard maintenance superintendent.



Outmoded ram at left requires four operators in driving wedges preparatory to ship launching. Right: With this pneumatic ram using a 16-in. stroke, one operator drives eleven wedges per minute.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Triaxial Compression Test Data Computed by Nomographic Chart

When a large number of soil samples are tested by the triaxial compression test to determine the angle of internal friction and the cohesion, the resulting data represents hours of computations by calculator or other means. In contrast, the accompanying nomograph reduces the time for a single set of computations to a matter of minutes. Knowing only the cumulative dial gage distance and the total axial load, the strain and the major principal stress are readily solved by one line on the nomograph.

The strain is given by the equation:

$$\text{Percent strain} = \frac{\text{deformation}}{\text{original length}} \times 100$$

and since the original length, or height, of all specimens are the same (in this case, 17.81 cm.) the "percent strain" scale is computed and plotted against the "cumulative dial change" scale, thus obtaining the corresponding strain for any degree of deformation. In this case, since the resultant data was to be used in plotting a stress-strain curve, the strain is plotted as a percentage.

The stress is given by the equation:

$$\text{Stress} = \frac{\text{axial load} - (\text{axial load})\ (\text{strain})}{\text{original area}}$$

where it is assumed that the increase in area due to the axial load is constant and in the ratio of

$$\frac{1 - \text{strain}}{\text{original area}}.$$

This equation may be written in the form

$$\text{Stress} = (\text{axial load}) \left(\frac{1 - \text{strain}}{\text{original area}} \right)$$

where it is a simple matter to compute the value of

$$\frac{1 - \text{strain}}{\text{original area}}$$

for any value of strain since the area for all samples is constant (in this case, 39.82 cm.^{2}). These values,

$$\frac{1 - \text{strain}}{\text{original area}},$$

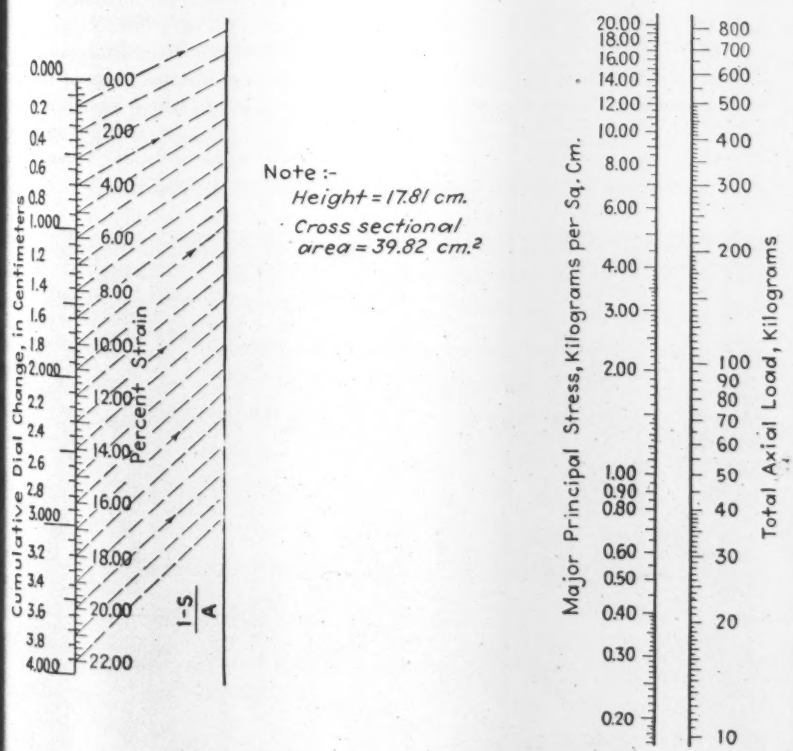
are transferred to a logarithmic scale and connecting guide lines drawn to corresponding values on the "percent strain" scale. However, no values are placed on this scale since it becomes a reference line in the nomograph.

The axial load is plotted on a logarithmic scale ascending in the same direction as the "$\frac{1 - \text{strain}}{\text{original area}}$" scale. The values of the "total axial load" scale and points on the

"$\frac{1 - \text{strain}}{\text{original area}}$"

scale are multiplied (logarithms added) by placing a straight edge across the two scales; the answer being obtained on the "Stress" scale. This scale is also a logarithmic scale, thereby allowing the stress to be determined to as many significant figures as space allows.

Data for one test may be computed, with accuracy, in less than 10 min. By calculator, 40 to 50 minutes are required with a much larger chance of error.—RAYMOND C. MASON, *assistant engineer, Soils Laboratory, U. S. Engineer Office, Galveston, Texas.*



Much time may be saved in making computations required to evaluate triaxial compression tests if nomograph of type above is used instead of a calculator.

Use of Haversines In Azimuth Calculations

For many years the following method of solving for azimuths taken from celestial observations has proved exceedingly rapid, easy to check, and simple to handle. The method depends upon the simplification of cumbersome trigonometric formulae by use of the trigonometric function of the haversine; the word haversine being a contraction of "one half of the versed sine". Use of haversines adapt formulae to easy calculation, much the same as auxiliary angles make for easy logarithmic calculations.

The azimuth formula used in this example is as follows:

Haversine Z = haversine ρ — haversine $(\phi - h)$ sec ϕ sec h where: Haversine Z = $\frac{1}{2}$ versed sine Z = sine^2 $\frac{Z}{2}$; Z = azimuth; ρ = polar

distance expressed in degrees = 90° − δ (declination); ϕ = latitude, and h = corrected altitude = observed altitude minus parallax and refraction. The above azimuth equation applies to observations on any celestial body providing, of course, that the declination is known.

The following rules determine position of azimuth:

(1) Azimuth always from north in north latitude; (2) Azimuth always from south in south latitude; (3) Azimuth always measured toward east if observed body is east of meridian (in case of sun this means A.M.); and (4) Azimuth always measured toward west if observed body is west of meridian (in case of sun this means P.M.).

As the haversine = ½ sine² the haversine (ϕ—h) is always positive, regardless of whether ϕ is greater than h or h greater than ϕ.

The first formula is derived from the fundamental spherical trigonometry equation

$$\text{Cos } A = \frac{\cos a - \cos b \cos c}{\sin b \sin c}$$

which is cumbersome to use in this form but adapted to the use of logarithms as follows:

$$\text{Cos A} = \frac{\cos (a + \theta)}{\sin b \sin c \sin \theta}$$

$$\text{where } \tan \theta = \frac{\cos b \cos c}{\sin a}$$

Instead of using this equation, which involves an auxiliary angle for azimuths of the sun, many surveyors prefer the well known formula

$$\text{Tan}^2 \tfrac{1}{2} A = \frac{\sin (s - b) \sin (s - c)}{\sin s \sin (s - a)}$$

$$\text{where } s = \frac{a + b + c}{2}$$

which is easily adaptable to logarithmic calculation.

For simple calculation one more device is the table of addition and subtraction logarithms, by which the azimuth formula

$$\text{Tan Z} = \frac{\cot \delta \sec \phi \sin t}{1 - a}$$

where a = cot δ tan ϕ cos t may be handled more easily. Given the value of log a, this table gives the value of $\log \frac{}{1 - a}$, thereby permitting the use of a simple logarithmic computation.

The following example shows a typical problem solved at Berkeley, Calif., Aug. 21, 1937. The calculations for this problem were as follows:

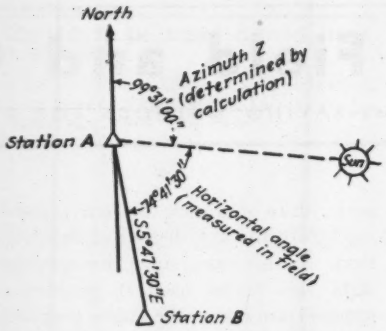


Chart used to illustrate simplified method of making azimuth calculation by use of haversines.

Latitude (ϕ)	= 37°58′20″N
Time	= 17ʰ 42ᵐ 10ˢ G.C.T. = 9ʰ 42ᵐ 10ˢ A.M. (P.S.T.) + 8ʰ 0ᵐ
Declination (δ)	= 12°05′37″ (From C. L. Berger & Sons Ephemeris)
Polar Dist. (ρ)	= 90° − δ = 77°54′23″
Altitude (h)	= observed h (31°26′30″) − parallax and refraction correction (01′27″) = 31°25′03″
Latitude − Altitude (ϕ − h)	= 37°58′20″ − 31°25′03″ = 6°33′17″

Now find Z by the equation
Hav. Z = (Hav. ρ = Hav. (ϕ − h) sec. ϕ sec. h

Natural hav. ρ	= 0.39525*	
Natural hav. (ϕ − h)	= 0.00327	subtract
Natural difference	= 0.39198	
Log difference	= 9.59326 − 10	add
Log sec. ϕ	= 10.10330 − 10	add
Log sec. h	= 10.06885 − 10	add
Log hav. Z	= 9.76541 − 10	
Azimuth Z	= N99°31′00″E	
Angle Sun to Sta. B	= 74°41′30″	

Azimuth Sta. A to Sta. B = 174°12′30″ from North. (Bearing S5°47′30″E)

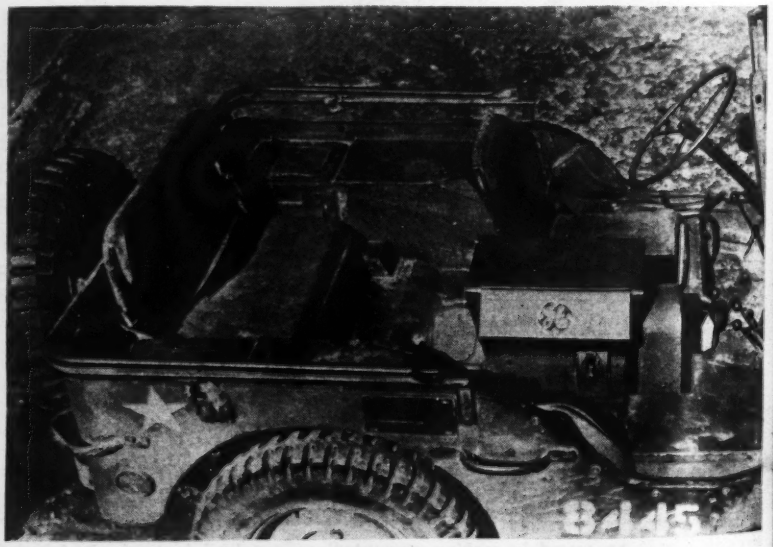
*Five-place tables of haversines are found in several publications of Hydrographic Office, U. S. Navy Dept., including "Useful Tables From American Practical Navigator", H. O. Publication No. 9, U. S. Govt. Printing Office, Washington, D. C.

For rapid calculation in computing azimuths from solar observations the above method is unique.—WILLIAM H. BRADY, *Registered Civil Engineer and Land Surveyor, Danville, Calif.*

Jeep Equipped with Arc Welder

Arc welding units are now being mounted on the ¼-ton army truck known to the public as the "jeep" for on-the-spot repairs for American military units operating near the front lines, the Ordnance Department, Army Service Forces, reports. During initial phases of landing operations in amphibious warfare, this mobile welder is of inestimable value, pending the arrival of standard welding equipment in subsequent waves.

The jeep possesses the advantage of being highly mobile, even over terrain which has been blasted by huge shells and bombs; in island warfare, the jeep can traverse pioneer jungle trails frequently too difficult for larger vehicles and wreckers. Smallness of the jeep makes it a very difficult target for enemy artillery fire. Moreover, the lightness and compactness of the vehicle are factors which permit the use of such a mobile welding unit in ordnance organizations accompanying airborne troops.



Method of equipping the jeep with portable electric arc welders.

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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

HIGHWAY, FLORIDA

OWNER: State Road Dept. of Florida, Tallahassee.

PROJECT: Construction of bituminous surfaced highway with shell base course 6.795 miles long from a point approximately 0.5 miles north of Clay County Line and Cedar Creek and between Cedar Creek and Hamilton Street along St. John's Avenue, Jersey Street and Park Street, southwest of Jacksonville, in Duval County, Fla. Includes necessary clearing and grubbing, excavation, drainage structures, curbs, walks and gutters, mixing and compacting roadway material, shell base course, bituminous surfacing, etc. Alternate was allowed for Ocala rock base or shell base course. Contract awarded on latter basis.

CONDITIONS: Contractor to furnish all material and complete work in 170 working days. Rail, highway and water transportation facilities available. Prevailing wage rates to be paid on project.

BIDS: Five bids were received December 19, 1944, ranging from the contract low of $375,511 to $421,257 on the shell base alternate, and from $390,659 to $456,213 on the Ocala rock base alternate.

LIST OF BIDDERS: (Shell base alternate)

1. Duval Engr. & Contracting Co., Jacksonville, Fla. (contract) $375,511
2. Brinson Construction Co., Tampa, Fla. 386,418
3. L. J. & W. L. Cobb, Inc., Tampa, Fla. 409,966
4. J. D. Manly Constr. Co., Leesburg, Fla. 420,108
5. Cone Bros. Contracting Co., Tampa, Fla. 421,257

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	72.07 ac.	$128.00	$200.00	$200.00
2. Regular excavation	58,122 c. y.	.56	.50	.51
3. Lateral ditch excavation	3,762 c. y.	.74	.75	.45
4. Subsoil excavation	7,064 c. y.	1.28	.60	.75
5. Remove exist. pavement (conc. curb, retaining walls, side walks, drives, and penetr. surf.)	9,890 s. y.	.20	.40	.50
6. Overhaul (½-mi. cu. yd.)	7,148 c. y.	.07	.10	.08
7. Mixing and compacting, roadway (6-in. deep)	36,201 s. y.	.05	.08	.10
8. Mixing and compacting, roadway (12-in. deep)	45,106 s. y.	.07	.12	.15
9. Stabilising material	2,138 c. y.	2.96	4.00	4.50
10. Mixing and compacting material, commercial (12-in. deep)	25,655 s. y.	.07	.12	.13
11 Ocala rock base (single course, 6-in. thick) (alternate)	116,520 s. y.	1.03	1.20	1.20
12. Tar prime material, RT-2, RT-3 or RT-4	26,217 gal.	.19	.20	.20
13. Paint material (RC-3)	13,982 gal.	.15	.15	.15
14. Concrete, Class A, culverts	495.31 c. y.	65.00	50.00	55.00
15. Concrete, Class A, headwalls	110.72 c. y.	50.00	55.00	55.00
16. Reinforcing steel	53,192 lb.	.065	.07	.08
17. Conc. pipe culv. (15-in. cross drain)	1,170 l. f.	2.75	2.00	2.25
18. Conc. pipe culv. (18-in. cr. drain)	3,349 l. f.	3.00	3.00	2.75
19. Conc. pipe culv. (21-in. cr. drain)	49 l. f.	4.00	4.00	3.50
20. Conc. pipe culv. (24-in. cr. drain)	2,123 l. f.	4.25	4.00	3.75
21. Conc. pipe culv. (30-in. cr. drain)	611 l. f.	6.00	6.00	5.00
22. Conc. pipe culv. (36-in. cr. drain)	647 l. f.	9.00	7.00	7.50
23. Conc. pipe culv. (42-in. cross drain)	99 l. f.	11.50	12.00	9.00
24. Conc. pipe culv. (18-in. side drain)	1,116 l. f.	2.75	3.00	2.75
25. Relay exist. cross drain pipe (21-in. conc.)	26 l. f.	1.50	4.00	2.00
26. As above, 24-in. conc. pipe	45 l. f.	1.50	5.00	2.00
27. As above, 30-in. conc. pipe	133 l. f.	2.00	5.00	2.50
28. Relay exist. side drain pipe, 18-in. conc.	153 l. f.	1.25	2.00	1.50
29. As above, 24-in. conc. pipe	82 l. f.	1.50	2.00	2.00
30. Underdrain (6-in. pipe)	8,636 l. f.	1.50	1.50	1.50
31. Inlets, Type C, 0-4-ft. deep	6 ea.	125.00	200.00	190.00
32. Inlets, Type E, 0-4-ft. deep	1 ea.	135.00	200.00	120.00
33. Inlets, Type E, 6-8-ft. deep	1 ea.	150.00	250.00	150.00
34. Inlets, Type BS, 4-6-ft. deep	7 ea.	140.00	250.00	130.00
35. Inlets, Type BV, 4-6-ft. deep	1 ea.	150.00	250.00	130.00
36. Inlets, Type BR, 4-6-ft. deep	10 ea.	140.00	250.00	130.00
37. Inlets, Type BM-1, 4-6-ft. deep	9 ea.	140.00	250.00	175.00
38. Inlets, Type BM-1, 6-8-ft. deep	3 ea.	165.00	300.00	200.00
39. Inlets, Type B-V-M-1 (4-6-ft. deep)	2 ea.	150.00	250.00	200.00
40. Inlets, Type BMR (4-6-ft. deep)	11 ea.	145.00	250.00	175.00
41. Inlets, Type BMR (6-8-ft. deep)	3 ea.	160.00	300.00	190.00
42. Manhole, Type A, 10-12-ft. deep	1 ea.	250.00	400.00	190.00
43. Manholes, Type B, (4-6-ft. deep)	6 ea.	200.00	250.00	120.00
44. Manhole, special, 4-8-ft. deep	1 ea.	250.00	400.00	150.00
45. Conc. curb and gutter	14,835 l. f.	1.25	1.20	1.
46. Conc. valley gutter	67 l.f.	1.50	2.00	1.
47. Concrete sidewalk, 4-in. thick	16,950 s. f.	.28	.25	.
48. Concrete sidewalk, 6-in. thick	3,094 s. f.	.35	.40	.
49. Right-of-way markers	41 ea.	8.00	4.00	5.
50. Sprigging	205,500 s. y.	.035	.03	.
51. Guard rail posts (conc.)	107 ea.	5.00	5.00	6.
52. Concrete ditch pavmt. (4-in. thick)	545 s. y.	2.25	4.00	2.
53. Relay exist. 4-in. water main	743 l. f.	2.10	1.00	2.
54. Shell base (single course, 6-in. thick) (Alternate)	116,520 s. y.	.90	1.00	1.
55. Reset existing curb	200 l. f.	.60	1.00	1.
56. Aggregate for wearing course	4,315 c. y.	6.75	6.00	6.
57. Aggregate for mineral seal	648 c. y.	5.90	7.00	6.
58. Retread bituminous material, plant mix	104,868 gal.	.10	.11	.

HIGHWAY AND BRIDGES, TEXAS

OWNER: Texas State Highway Dept., Austin, Tex. S. J. Treadway, Abilene, Tex., engineer.

PROJECT: Grading, structures, flexible base and double asphalt surface treatment of 12.051 miles of U.S. Highway 84 and 83 from U.S. Highway 83 to Coleman County Line, Taylor County, Tex. Includes necessary clearing and grubbing, excavation, blading embankment, stripping, rolling, overhaul, culverts, bridges, concrete piling, riprapping, sodding, roadway surfacing, and appurtenant work required for completion of project.

BIDS: Six bids were received December 12, 1944, ranging from the low of $488,072 to $623, 654.

LIST OF BIDDERS:

1. T. M. Brown & Son, Baird, Tex. (low bidder) $488,07
2. Austin Bridge Co., Dallas, Tex. 557,54
3. Thomas & Ratliff, Rogers, Tex. 575,17
4. Brazos Valley Constr. Co., Mineral Wells, Tex. 589,47
5. Holland Page, Austin, Tex. 613,28
6. Ernest Loyd, Fort Worth, Tex. 623,65

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	72.95 ac.	$40.00	$100.00	$70.00
2. Unclassified roadway excav.	179,020 c. y.	.35	.45	.44
3. Common borrow	8,084 c. y.	.20	.45	.44
4. Unclass. channel excavation	96,244 c. y.	.23	.45	.35
5. Unclass. structural excav. (culv.)	1,001 c. y.	2.50	4.00	3.50
6. Unclass. struct. excav. (bridges)	924 c. y.	2.50	5.00	7.50
7. Blading embankment	1,325 hr.	3.50	6.00	5.00
8. Stripping	6,800 c. y.	.50	.25	.35
9. Overhaul (yd. quarter-mile)	99,222 yd.	.10	.08	.07
10. Sprinkling	18,910 M gal.	1.50	.75	2.00
11. Rolling	2,450 hr.	3.50	3.75	4.00
12. Rolling	1,295 hr.	3.50	5.00	6.00
13. Flexible base	122,317 c. y.	.70	.85	.75
14. Additional ½-mile haul	2,503,039 c. y.	.03	.025	.02
15. Prime coat (MC-1)	73,845 gal.	.11	.14	.10
16. Asphalt (100-150 pen.)	104,200 gal.	.11	.13	.10
17. Aggregate	3,620 c. y.	5.00	4.50	4.75
18. Cold mix blended rock asphalt pavement (Type B)	23 ton	10.00	10.00	7.50
19. Class A concrete, culvert	831.06 c. y.	23.50	31.00	35.00
20. Class A conc. for ext. str.	364.55 c. y.	30.00	31.00	35.00
21. Class A conc. (bents)	349.05 c. y.	23.50	31.00	35.00
22. Class A conc. (spans)	609.40 c. y.	23.50	31.00	35.00
23. Rainforcing steel	331,768 lb.	.055	.0625	.07
24. Structural steel	393,940 lb.	.07	.075	.07
25. Removing old structures	21 ea.	100.00	90.00	190.00
26. 16-in. sq. cast-in-place conc. piling	120 l. f.	5.50	6.00	8.00
27. 16-in. sq. precast conc. test piling	140 l. f.	5.50	11.00	8.00
28. 16-in. sq. precast conc. piling	1,395 l. f.	5.50	5.75	8.00
29. Railing (Type 1)	1,440 l. f.	4.00	3.85	4.00
30. Railing (Type 2)	208 l. f.	4.00	2.50	4.00
31. Dry riprap (Type A)	439 c. y.	5.50	8.00	8.00
32. Grouted riprap	42 c. y.	7.00	16.00	10.00
33. Common mortar riprap	130 c. y.	12.50	17.00	15.00
34. Grates	1 ea.	15.00	25.00	10.00
35. Spot sodding	6,438 s. y.	.04	.06	.25
36. Concrete curb and gutter	6,292 l. f.	1.50	1.50	2.00
37. Right-of-way markers	168 ea.	2.50	2.50	3.00
38. Remove and replace rt.-of-way markers	8 ea.	1.50	2.00	2.00
39. Remove and replace timber post guard fence	140 ea.	1.50	2.00	2.00
40. Place timber post guard fence	11 ea.	1.50	1.25	1.00
41. Obliterate abandoned road	159 sta.	3.00	20.00	5.00
42. Remove old conc. (driveways and pavmt.)	1,522 s. y.	.50	.80	.25

Q { Will "M.P.T."* be important when construction starts up?

A It sure will! For example—one contractor was losing time on 5 machines through slow lubricating methods. With an Alemite Portable Service Station, power lubrication was brought "to the job." Lubricating time was cut 50%—gaining 100 minutes "M.P.T."* per day. The savings in time, maintenance and machines soon paid for the new method. While you're waiting for construction to start again, why not get all the facts? Use the coupon.

*More Productive Time

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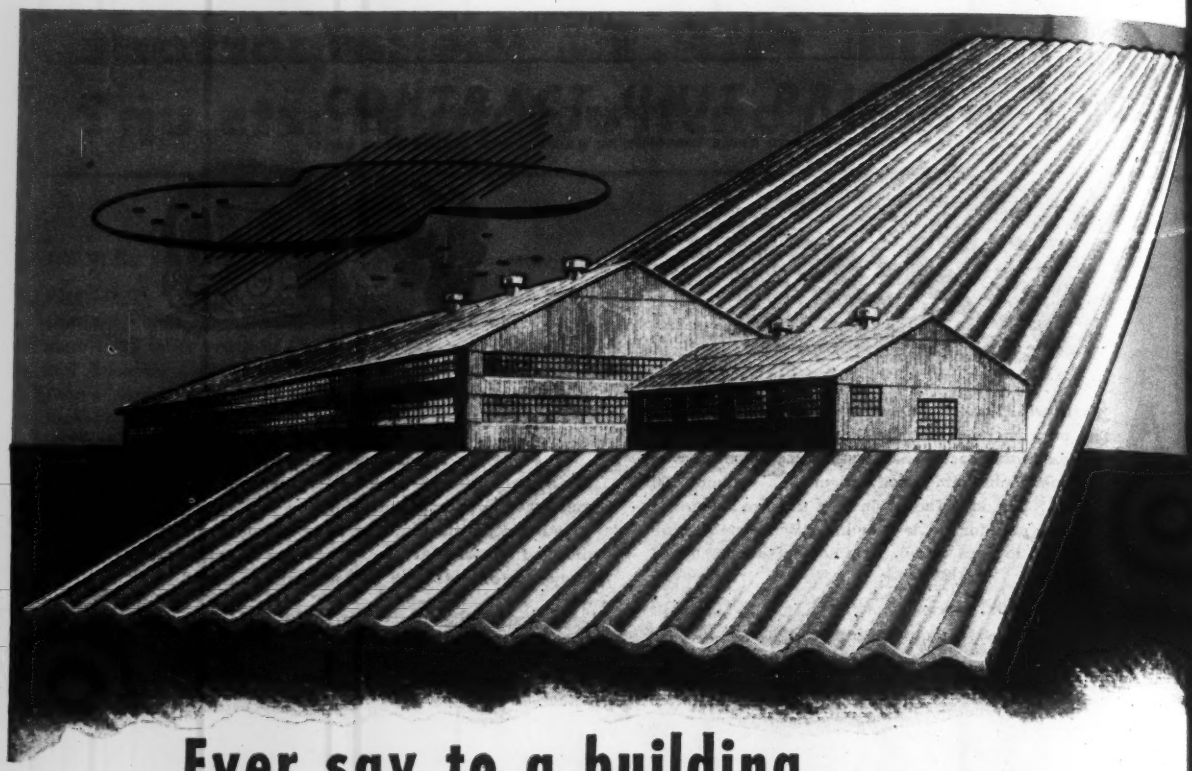

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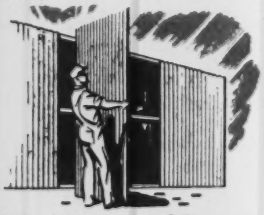

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Careystone is in service on hangars, chemical plants, railroad buildings, foundries, factories and warehouses . . . and on buildings exposed to the corrosive effect of salt air. It's a "natural" where atmospheric conditions are rough on buildings.

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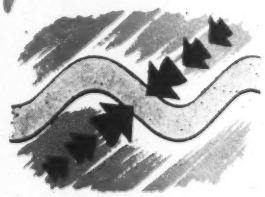

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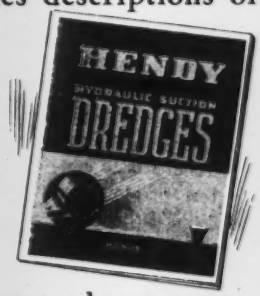

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The Week IN ENGINEERING AND CONSTRUCTION

(Continued from page 75)

House committee favors Columbia River projects

Among the outstanding recommendations in the report of the Committee on Irrigation and Reclamation of the House of Representatives dealing with investigations of the Columbia River and its tributaries are these:

1. The authorization by Congress of not less than $25,000,000 for use, as soon as manpower is available, so that the Bureau of Reclamation and other agencies may complete field surveys, designs and specifications for irrigation, power, and other multiple-purpose projects in the Columbia River basin.

2. That the Bureau of Reclamation expedite plans for the early construction of the authorized Hungry Horse Dam and water storage reservoir on the Flathead River in Montana for irrigation, flood control, and for power generation at the dam and the increase of firm power production at the Grand Coulee and Bonneville power plants. The committee opposes the construction of any dam that would raise the level of Flathead Lake. It also opposes construction of a dam at Albeni Falls, Idaho, proposed to store water by raising the level of Lake Pend Oreille.

3. The committee recommends the construction of the Cabinet Gorge Dam and hydroelectric project to supply power to local industries in north Idaho, and the mining and smelting industry of the Coeur d'Alene district.

4. The committee recommends the speedy construction, in the postwar period, of the necessary reservoirs and the completion of the Columbia Basin irrigation project. Grand Coulee Dam was built to make this project possible.

5. The committee recommends the construction of the necessary dams in the Columbia and Snake rivers, including the Umatilla Dam, to provide for tidewater transportation on the Columbia and Snake to the confluence of the Clearwater River at the twin cities of Lewiston, Idaho, and Clarkston, Wash.

6. As part of this construction program to complement river transportation downstream from Lewiston and make accessible the vast resources upstream on the Snake, Salmon, and Clearwater Rivers, the committee recommends that the Lewis and Clark Road through the Lolo Pass, be given high priority and completed as soon as war conditions will permit. This road-construction program includes, and the committee recommends, the early completion of the Salmon River Road between Shoup and Riggins, Idaho.

Copies of the report may be obtained from the Superintendent of Documents, Washington, D. C. It is entitled "Investigation of the Columbia River and Its Tributaries," and is recorded as "Union Calendar No. 710."

• • •

Montreal court rules against engineers

Recently Justice O. S. Tyndale of the Superior Court, Montreal, Que., ruled that only a member of the Province of Quebec Association of Architects can "furnish for remuneration plans or specifications to construct or remodel a building." This decision resulted from an action brought by the architects against an engineer for making plans to construct a machine shop. The defendant was found guilty of having violated the Quebec Architects' Act.

The defendant's plea rested entirely on the claim that the building in question was "a mechanical engineering works" as mentioned in the Quebec Professional Engineers' Act. However, the judgment inferred that there is a restricted class of buildings that can be considered as engineering works. Granting that "works" are the clear and legitimate field of engineers, the judge decided that any buildings envisaged in the word "works" must be *accessory* only, and therefore he denied the defendant's plea because his project was not an accessory to a larger one.

In his conclusions Justice Tyndale established the necessity for an engineer designing a building to be "concerned" in the construction of the entire "work" of which his building is an accessory. As an example, reference was made to the building enclosing the turbines and generators of an hydro-electric power development, which, it was admitted, would be the work of an engineer because it was "accessory only."

The case is to be appealed and the Engineering Institute of Canada has announced that it will be fought to the highest court, if necessary. At the same time an endeavor will be made to amend the Quebec Professional Engineers' Act.

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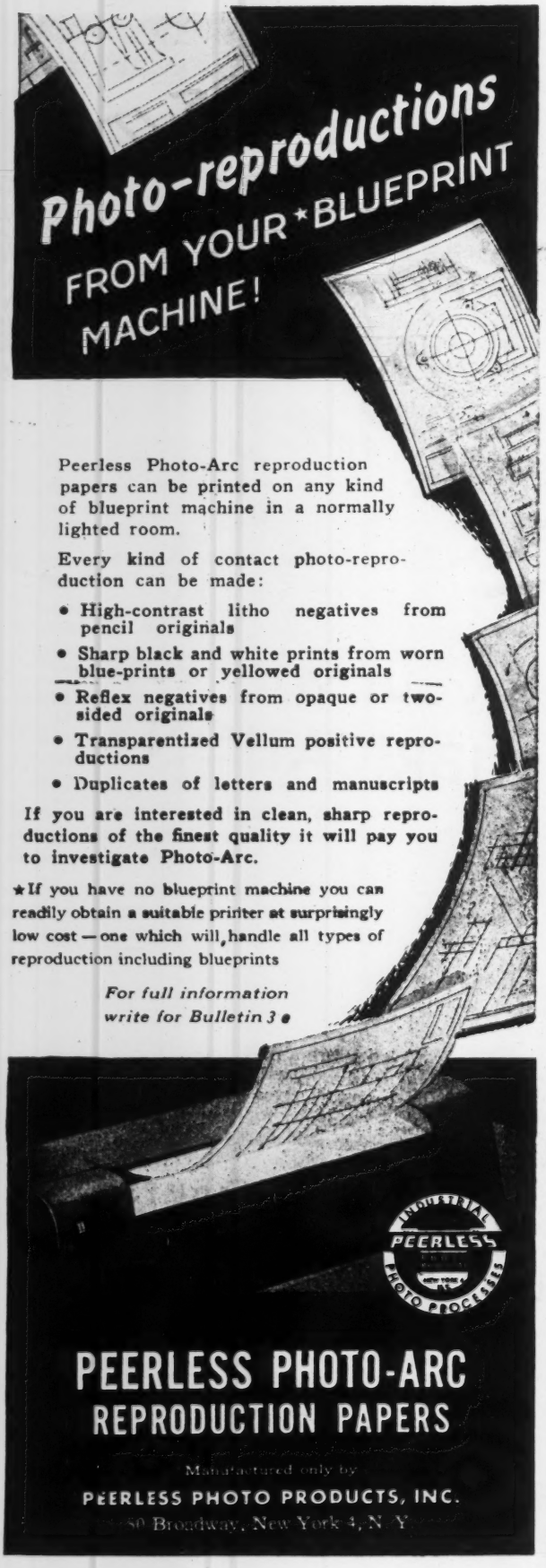
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Manufacturers' Activities

Thad Broadrick, with Clyde Iron Works, Inc., in the New York area for 20 years, has just been made assistant to Oliver Maggard, vice president of the company. Broadrick will be in charge of all sales in the metropolitan area for the Clyde line of hoists, derricks, whirleys, deck machinery and similar equipment. For many years he was with the O'Rourke Engineering Construction Co.

TRACTOR & EQUIPMENT CO., Chicago, Ill., has expanded its facilities by taking a 10-year lease on the 200x60-ft. building adjacent to the present plant at 3515 West 51st St. The company specializes in the sale and service of new and used industrial and construction machinery, including locomotives, cranes, crawlers and shovels, truck cranes and rock crushers.

LT. COL. C. B. GOULD, for many years manager of the Detroit office of Barber-Greene Co., Aurora, Ill., manufacturer of asphalt paving machines and material handling equipment, has recently been released from the Army Air Corps, and has returned to his previous capacity. At Morrison Field, West Palm Beach, Fla., he was engineer officer of the 15th Group. Since 1943, he has been with the Army Air Transport Command, Homestead, Fla., as commanding officer of the 54th Squadron.

ARTHUR R. C. MARKL has been made chief research engineer of Tube Turns, Louisville, Ky. Mr. Markl was for fourteen years associated with the M. W. Kellogg Co., New York. He is a graduate of the Technical Institute of Munich.

Tube-Turns manufactures seamless welding elbows and related welding fittings for the piping systems of a wide range of industries. The firm also manufactures flanges and is a large-scale producer of aluminum steel forgings.

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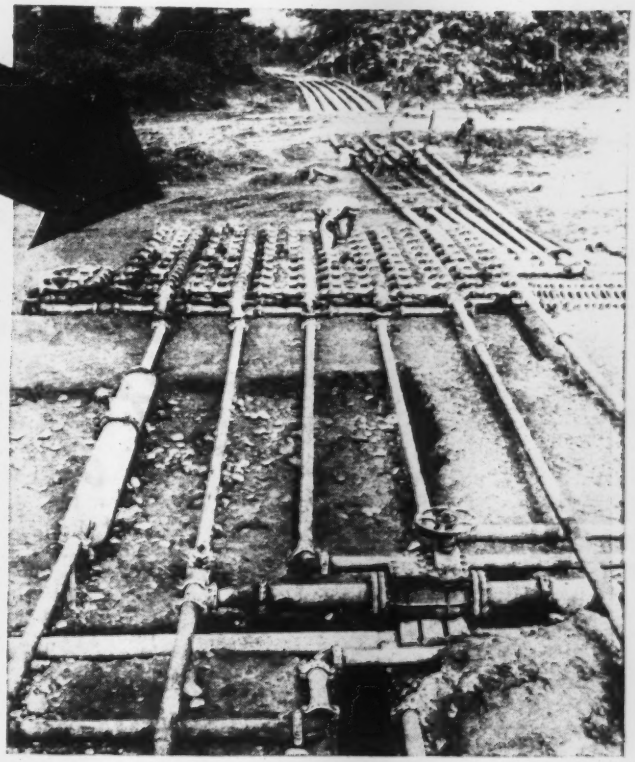

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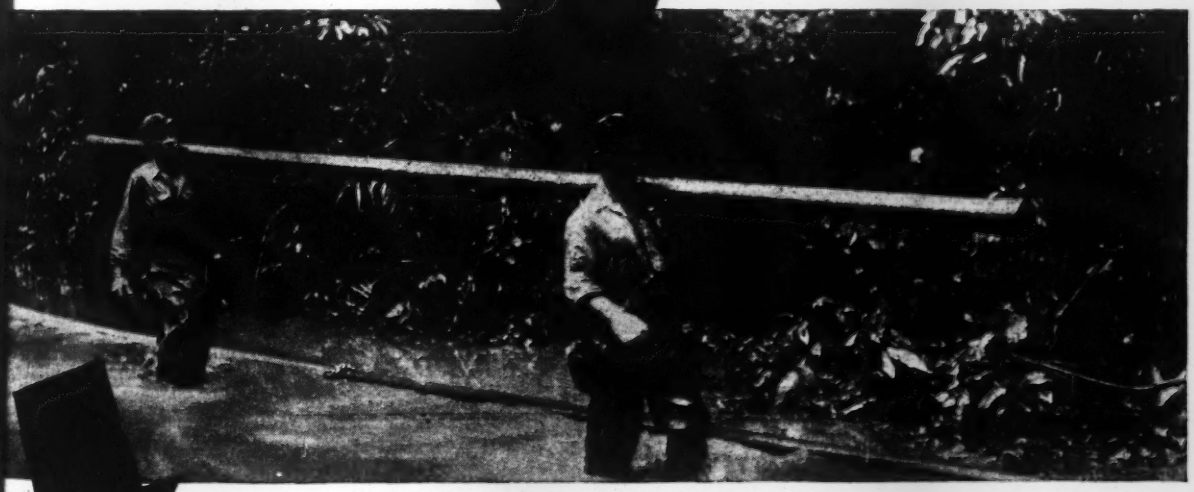

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BOSTON • CINCINNATI • NEW ORLEANS

W. G. HOLTON, JR., president of the Walworth Co., manufacturers of valves and fittings, has been elected president of The Valve Manufacturers Association.

Since March 9, 1943, Mr. Holton has been production consultant and head of the valve and fittings industry for the War Production Board in Washington as a dollar-a-year man. In accepting Mr. Holton's resignation, H. G. Batcheller, chief of industry operations and vice-chairman of the War Production Boards, expressed the appreciation of the board for his "interest, resourcefulness, helpful guidance and competent advice in the handling of the many problems that have been ever present in the valve and fitting industries."

Mr. Holton is also chairman of the newly established Navy Industrial Association, an organization of several hundred industrial, railroad, and public utility corporations for the purpose of continuing effective cooperation between private business and the Navy.

As president Mr. Holton succeeds Ernest Cochran, vice-president of the Chapman Valve Manufacturing Co., Indian Orchard, Mass.

F. T. S. MEARES, mechanical plant department manager of Noyes Bros. Ltd., engineers and merchants of Sydney, Australia, has arrived in the United States for a two months visit.

Arrangements have been made for discussion between Mr. Neares and a number of prominent engineering companies on the development of trading relationship in Australia.

Mr. Meares' contact address will be Care of American Express Co., Inc., 65 Broadway, New York, N. Y.

William B. Mercer is back with Robins Conveyors, Inc. In the fall of 1942, he was loaned to the War Production Board, material handling division, where he was chief in charge of the conveyor and mechanical power transmission equipment section. Now Mr. Mercer returns to the Boston office where he will handle the sales of Robins materials-handling machinery, sharing the New England territory with J. F. Donahue in charge of Mead-Morrison division sales.

Elections and Activities

New officers of the Constructors Association of Western Pennsylvania are: president, Carl B. Jansen, manager of the general construction department, Dravo Corp.; vice-president, highway division, Max C. Harrison, executive vice-president and treasurer, Harrison Construction Co., vice-president of the heavy engineering and railroad contracting division, Carl J. Jacobsen, Carl J. Jacobsen Co.; corporate secretary, J. E. O'Leary, sales manager, Pittsburgh-Des Moines Steel Co.; assistant secretary, C. Arthur Brotemarkle, S. T. Brotemarkle Construction Co.; treasurer, D. Dinardo, Dinardo, Inc. Roy A. MacGregor was renamed executive secretary.

C. B. Jansen

W. E. Lehman, president of the Lehman-Roberts Co., Lexington, has been elected president of the Kentucky Association of Highway Contractors. He succeeds W. E. Wells, Carrollton. C. H. Gutermuth, Louisville, was elected first vice-president, and Fount Crow; Beaver Dam, second vice-president. New directors are: H. D. Strunk, Somerset, and Graham Webb, Ashland. Reelected are J. C. Codell, Winchester; J. R. Breeden, Madisonville; G. D. Davies, Frankfort; A. D. Gorman, Flemingsburg, and Wells.

H. Fred Watts, Steinwald & Watts Construction Co., Denver, has been elected president of the Colorado Contractors Association, chapter of the Associated General Contractors of America. He replaces A. S. Horner, Denver, who becomes a director. Other new officers are: R. J. Lawrence, Lawrence Construction Co., Denver, first vice-president; Jay T. Williams, C. V. Hallenbeck and Jay T. Williams, Denver, second vice-presidents; Dale B. Levi, D. B. L. Construction Co., Denver, secretary-treasurer. Directors are: R. S. Blanchard, Blanchard Brothers; C. L. Hubner, C. L. Hubner Co.; Stanley L. Larson, Larson Construction Co.; M. J. Sears, C. A. Switzer and Mr. Horner, all of Denver, and G. H. Honne, Ed. H. Honnen Construction Co., Colorado Springs.

At a joint meeting of the Wisconsin chapter of the Associated General contractors and the Wisconsin Constructors, Inc., the following officers were elected: —Wisconsin chapter A.G.C., president, Mark A. Cullen, Janesville; vice-president, Nick J. Schmetz, Madison; secretary-treasurer, E. F. Nelson, Jr., Oshkosh.

Wisconsin Constructors, Inc., president, Nick J. Schmetz, Madison; vice-president, Edward Hoeppner, Eau Clair; vice-president, Merrill Jones, Racine, Secretary-treasurer, Frank Theu, Oshkosh.

J. Harry Green of Janesville is executime secretary of the two groups.

Ontario General Contractors Association has elected these officers: W. J. Bradford, Bradford-Hoshae, Ltd., Toronto, president; Norman Cloke, Cloke Construction Co., Ltd., Toronto, vice-president; Robert W. Johnstone, Anglin-Norcross Ontario, Ltd., Toronto, secre-

ASPHALT - AGGREGATE ADHESION AS IMPROVED BY CHEMICAL ADMIXTURE

CASE NO. 1

• AGGREGATE CAN BE WET OR DRY

"We wish to inform you that last Winter we applied on penetration work approximately 50,000 gallons of 115 penetration asphalt treated with your NOSTRIP compound. Much of this material was applied below freezing temperature and all of it was applied under **wet and adverse weather conditions.** We obtained perfect adhesion, and there has been no evidence of the stripping of asphalt from the aggregate. Without the use of your NOSTRIP compound this work could not have been completed during the Winter months."

Above is an excerpt of a letter from a Rhode Island contractor. Name on request.

your first drum

is our best salesman!

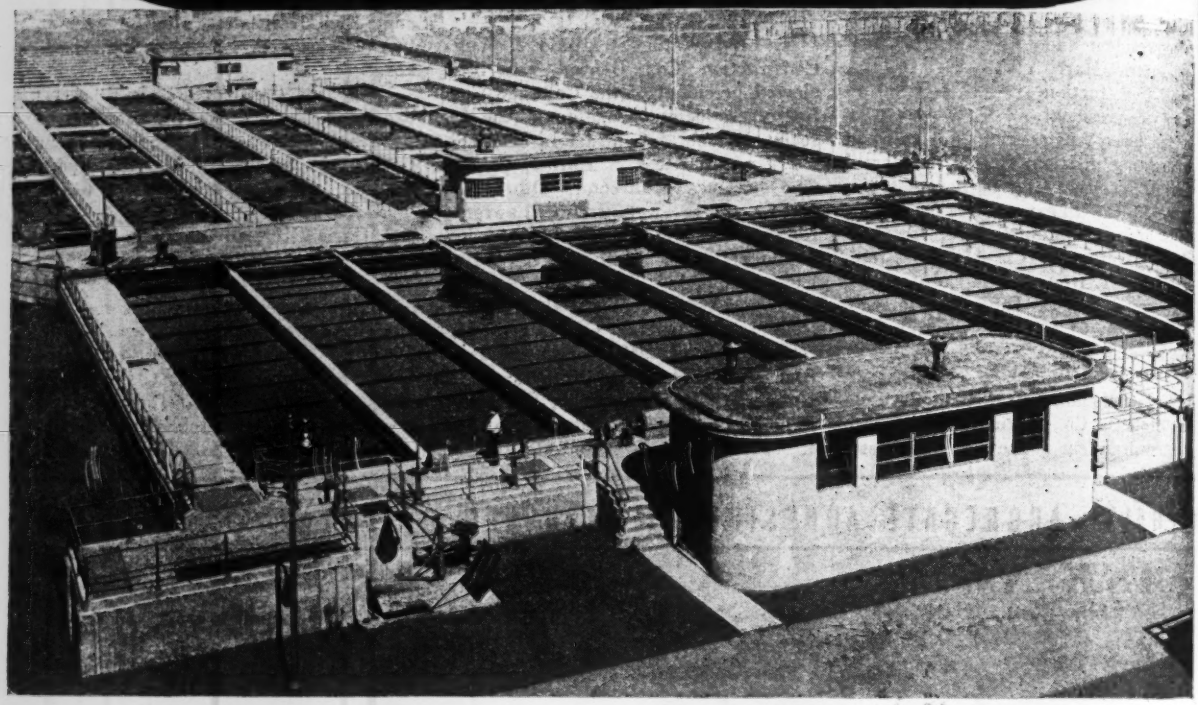
THE ALL-YEAR ROAD MATERIAL

NOSTRIP

AN ADMIXTURE FOR TAR AND ASPHALT

MAGUIRE INDUSTRIES, INCORPORATED • NOSTRIP DIVISION • 122 E. 42nd ST. NEW YORK, 17, N.Y.

Jeffrey



As the need grows for more adequate and modern sewage and water treatment, you will find Jeffrey equipment in more and more plants throughout the country.

Bar screens, screenings grinders, garbage grinders, grit collectors and washers, floc-trols, sludge collectors for primary and secondary settling tanks . . . are just a few of the Jeffrey units (all patented) which make for efficient sewage and water purification and processing. Also equipment for biofiltration plants.

Jeffrey has the engineering staff—the manufacturing experience—and plant facilities to help you in designing and equipping your plant for most economical and efficient operation. Consult Jeffrey on sewage and water treatment equipment.

E JEFFREY

ESTABLISHED 1877

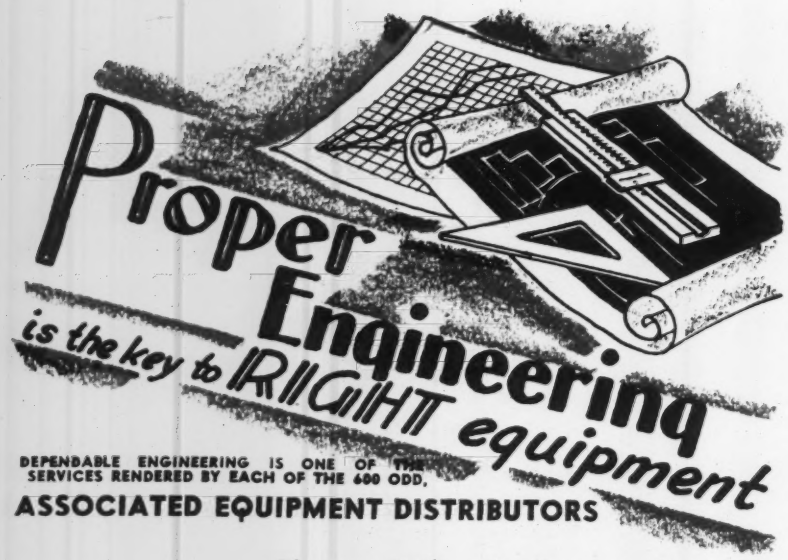
JM

Common sense governs Allis-Chalmers tractor design...that's why performance is down to earth. There is all the power you need for loading large capacity scrapers and handling heavy bulldozer loads . . . plus extra speed for moving the material faster. 2-cycle Diesel tractors hang on longer, too — provide greater flexibility in speed with less shifting, because drawbar pull is maintained over a wider speed range.

Maintenance is simple! Uniform design and manufacture permit convenient interchange of engine parts between all models—sleeves, pistons, rings, connecting rods, injectors and many others. Reduces parts inventory, saves time and money, simplifies repairs—of particular advantage to fleet owners.

It will pay you to investigate the many EXTRA advantages 2-cycle Diesels provide.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.
2-CYCLE *The Modern Diesel Power!*



DEPENDABLE ENGINEERING IS ONE OF THE SERVICES RENDERED BY EACH OF THE 600 ODD,

ASSOCIATED EQUIPMENT DISTRIBUTORS

These reliable distributors of construction machinery with their many branch service shops are located throughout the 48 States of the Union, in Canada and Mexico.

Use their trained and experienced construction technicians to help you decide upon the right equipment for your next job. In their files are records and case histories of thousands of jobs.

If your problem is earth-moving, excavation, ditching, mining, quarrying, blasting, dam building, road building, paving, airport or housing development, highway maintenance, power development or marine propulsion—regardless of the job, here is a National organization of individual organizations ready and willing to help you—engineering-wise and service-wise.

BUY SAFELY - Buy from an A.E.D. Member

ASSOCIATED EQUIPMENT DISTRIBUTORS

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tary and Robert L. Moran, secretary-manager.

The Associated General Contractors of Missouri have elected officers as follows: president, B. W. Tibbs, St. Louis; vice-president of Rock Hill Asphalt Construction Co.; vice-president, Otto W. Knutson, Kansas City; treasurer, J. M. Joyce, Cameron, Joyce & Company, Keokuk, Iowa; and E. C. Wagner, secretary, of Jefferson City.

Robert Dott, State Geologist of Oklahoma has been elected president of the Association of American State Geologists. Dr. Edward Troxsil, State Geologist of Connecticut, vice-president, and Dr. Meredith Johnson, State Geologist of New Jersey, Secretary.

Three of the eight living charter members of the Engineering Club of Baltimore, Md., were presented with honorary membership certificates at a meeting commemorating the 40th anniversary of the founding of the club. They were Major Joseph W. Shirley, Howard R. Pratt and Oliver C. Cromwell. Thirty-eight engineers formed the club in 1905. It now has 750 members, with approximately 2,500 members in affiliated groups in Maryland.

L. E. Mitchell has been elected chairman of the Halifax, N. S., branch of the Engineering Institute of Canada. He succeeds G. J. Currie, who reported that the membership of the branch was 501, showing an increase of 34 over the preceding year. Also, that the membership is the fourth highest in Canada. The new chairman is chief engineer for the Imperial Oil Company, at Imperial, N. S. Named to the executive committee were: E. C. O'Leary, J. Wightman, A. H. MacKinnon, J. L. Wickwire, S. A. Forbes.

Charles L. Harney, San Francisco, has been elected as the 1945 President of the Northern California Chapter of the Associated General Contractors; Ross A. Westbrook, vice-president. H. Earl Parker was added to the board representing the section north of Sacramento, with Lynn Schloss, Oakland, representing the East Bay, and Lloyd Holton, San Francisco.

Walter N. Frickstad is the new vice-president of the western district of the municipal division of the American Road Builders' Association.

J. L. Lang, Sault Ste. Marie, has been elected president of the Association of Professional Engineers of Ontario; and Lt. Col. E. Cole, Winnipeg, president Manitoba group.

HOW TO DRILL

More Footage FASTER!

ON JOBS that you would ordinarily do with hand-held drills you'll get more footage and get it faster with less manpower by using Sullivan "Lightweight" Wagon Drills. All the burden of drilling is taken from the arms of the operator and put on an independent air motor and feed-chain which provide an even, continuous and greater pressure on drill bit. One man operating a 75 lb. drill on a Sullivan LIGHTWEIGHT will drill as much footage as two men each using a 55 lb. hand-held drill.

Pneumatic-tired wheels make them easy to handle. Simple, rugged, positive-locking brakes eliminate anchor pins and reduce set-up delays leaving more time for actual drilling.

The Sullivan diesel-powered, 210-cubic foot, two-stage, "plus portable" shown is typical of the portable compressors which are supplying air power for operating Sullivan wagon drills, hand-held drills, paving breakers, spaders, trench diggers, sheeting drivers, plug drills and other Sullivan con-tractors' tools. They contain all the features that only Sullivan can give you: two-stage compression, ball main bearings, controlled air cooling, super intercooling, micro lift valves that last six to eight times longer, and forced lubrication that reaches every bearing and working surface.

Ask your Sullivan representative for bulletins on wagon drills and portable compressors, for details on how they save manpower, time and maintenance. There's a representative in every principal city.

SULLIVAN MACHINERY COMPANY, Michigan City, Indiana
In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario

PRODUCTS:
Portable Compressors • Rock Stationary Compressors • Wagon Drills • Core Drills • Portable Hoists • Paving Breakers • Trench Diggers • Sheeting Drivers • and other Pneumatic Tools

• The one man above is operating two Sullivan Lightweight wagon drills and a 210 cu. ft. Sullivan Plus Portable and drilling 600 ft. daily of 18 to 24 ft. holes in soft limestone.

• The Sullivan "Piston-Motor" Feed is a simple, four-cylinder, reversible air motor that provides an infinite range of feed pressures and speeds with plenty of power for pulling stuck steel.

A world-wide organization . . . established 1851

SULLIVAN

OFFICES Birmingham • Boston • Butte • Chicago • Claremont • Dallas • Denver • Duluth • El Paso • Huntington • Knoxville • Los Angeles • Middlesboro • New York • Philadelphia • Pittsburgh • Portland • Salt Lake City • San Francisco • Seattle • Spokane • St. Louis • Washington, D. C.

POWER TO WIN

Vital Continental-Powered equipment loading and transporting more and more Continental Red Seal Engines to the front for active service is not an uncommon sight at supply bases all over the world.

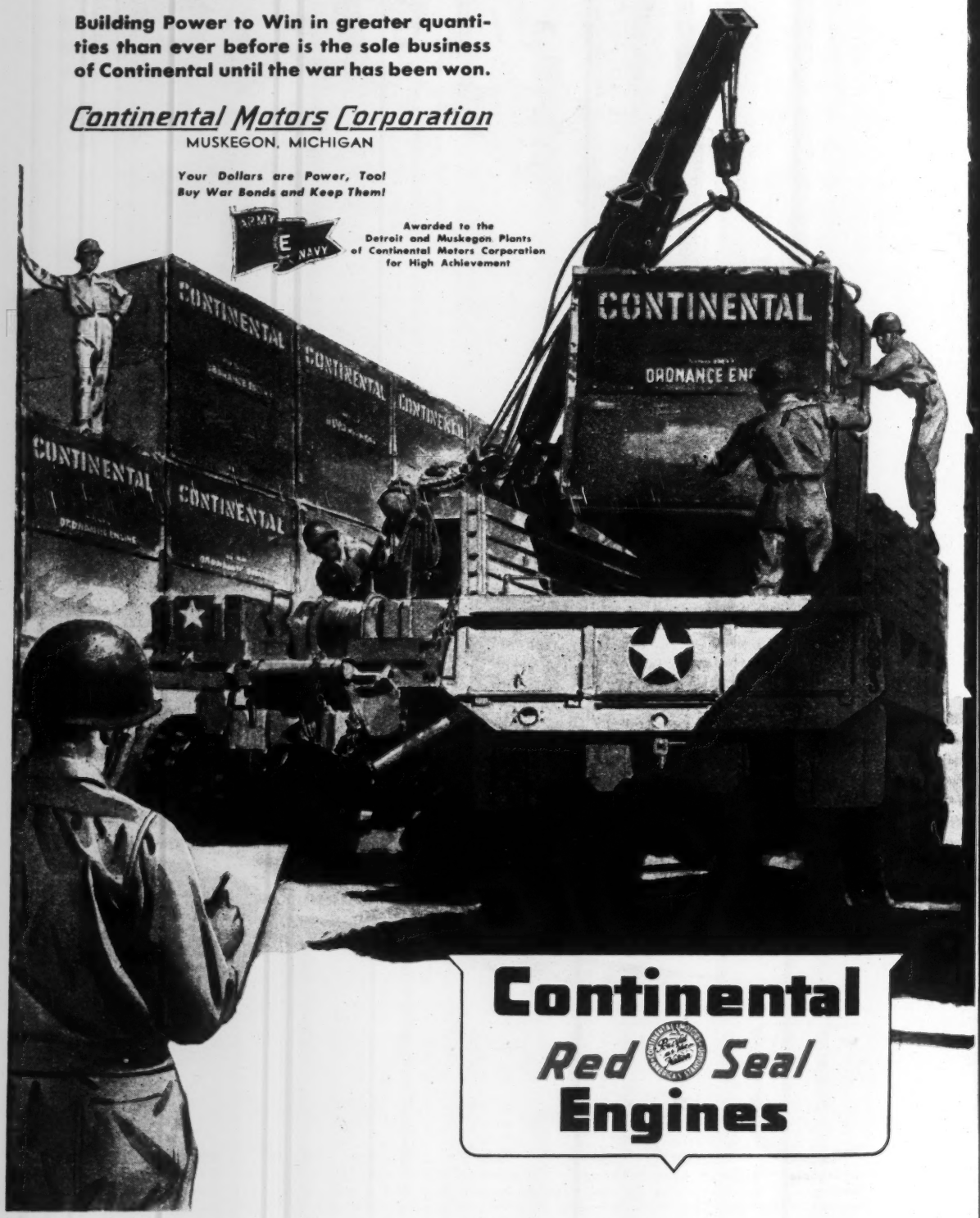
Building Power to Win in greater quantities than ever before is the sole business of Continental until the war has been won.

Continental Motors Corporation
MUSKEGON, MICHIGAN

Your Dollars are Power, Too!
Buy War Bonds and Keep Them!

ARMY E NAVY

Awarded to the Detroit and Muskegon Plants of Continental Motors Corporation for High Achievement



Continental
Red Seal
Engines

Now... Nylon-Insulated Wires and Rubber Plug Closures on all Du Pont Electric Blasting Caps

Here's news . . . the entire line of Du Pont Instantaneous and Delay Electric Blasting Caps is now equipped with nylon-insulated wires and rubber plug closures. These outstanding improvements make Du Pont Electric Blasting Caps better and safer than ever:

1. Nylon-Insulated Wires—Reduce misfires resulting from current leakage. Vivid contrasting colors increase visibility . . . minimize the possibility of error in hooking up.

2. Rubber Plug Closures—Assure maximum water resistance . . . permit use of shorter cap shells . . . make priming easier, safer.

These improvements, products of Du Pont research, represent the greatest advance in electric blasting caps in half a century. Your Du Pont Explosives representative will gladly show you samples of these new caps. Be sure to see them.

E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

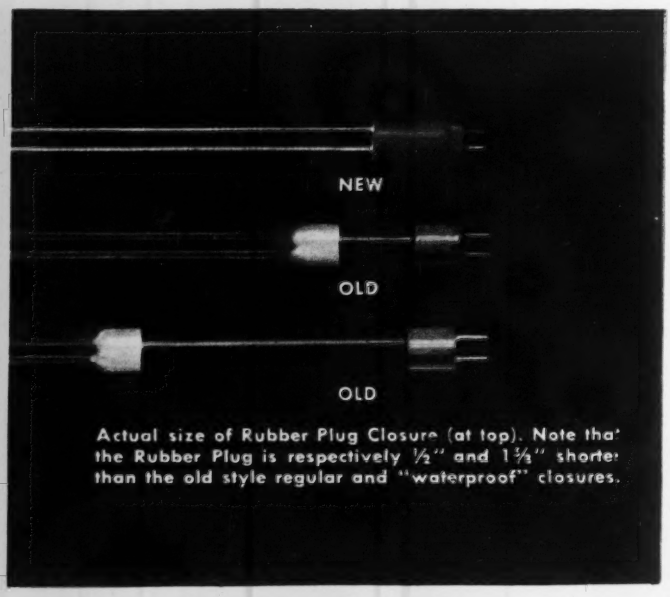
DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

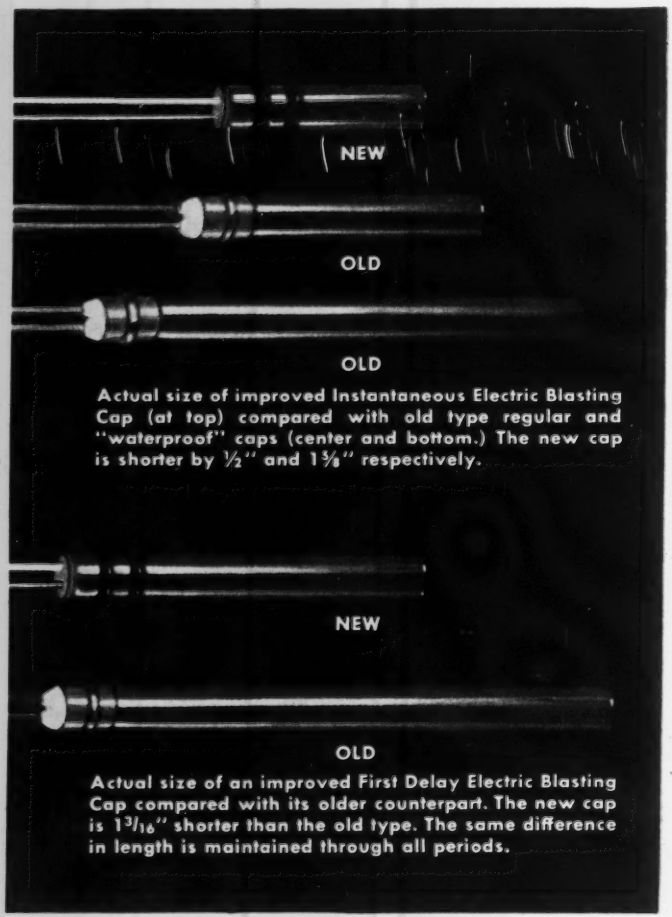
DU PONT

REG. U.S. PAT. OFF.

These exclusive feature



Actual size of Rubber Plug Closure (at top). Note that the Rubber Plug is respectively ½" and 1⅜" shorter than the old style regular and "waterproof" closures.



Actual size of improved Instantaneous Electric Blasting Cap (at top) compared with old type regular and "waterproof" caps (center and bottom.) The new cap is shorter by ½" and 1⅜" respectively.

Actual size of an improved First Delay Electric Blasting Cap compared with its older counterpart. The new cap is $1^{3}/_{16}$" shorter than the old type. The same difference in length is maintained through all periods.

make Du Pont Electric Blasting Caps safer and better

● Today, when increased production is so vital to the war effort, two important improvements in Du Pont Electric Blasting Caps are helping industry do the job faster and safer. Here are the details:

Nylon-Insulated Wires—Nylon plastic wire covering is tough and abrasion-resistant . . . and it is not affected by extreme or rapid changes in temperature. It is equal to enamel insulation in preventing current leakage . . . yet, when necessary, it is readily removed for making connections. Nylon-insulated wires are clean to handle and resist kinking. Brilliant colors make them easy to see.

Rubber Plug Closures—These plugs, double crimped in the shells, replace the former combination of bridge plug, asphaltic waterproofing compound and sulfur seal. This allows a substantial reduction in shell length without any reduction in explosive strength. Shorter shells make priming easier and the loading of primers safer. Rubber plug caps have far greater water resistance than old style, asphalt-sealed "waterproof" caps . . . and their performance is not affected by extremes of temperature.

These exclusive features make Du Pont Electric Blasting Caps more dependable than ever. *And the most dependable detonators are the safest detonators.* So don't run the risk of misfires . . . use Du Pont Caps.

E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

• • •

Note: Nylon and rubber are allocated for the above described purposes by the War Production Board.

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

DUPONT

New Aids to the Constructor

Tilting Meter

Three fundamental features are incorporated in a new tilting U-tube mechanical meter: (1) flow measurement by response to differences in pressure by a mercury seal in a U-tube; (2) weighing mass by means of a beam balance; and (3) the use of torsion tubes as the scientific solution of the stuffing box problem.

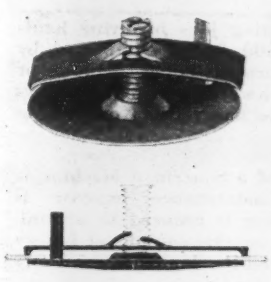
This meter is said to have exceptionally high operating torque, which results in high accuracy over long-life.—*Cochrane Corp., 17th & Allegheny Ave., Philadelphia 32, Pa.*

• • •

Cover Plate

Made of SAE 1060 steel, heat-treated, Parkerized and coated with zinc chromate primer, a new cover plate is available in three sizes. These will fit a wide range of panel thicknesses and cover holes $\frac{3}{8}$, $1\frac{1}{8}$ and $1\frac{3}{8}$ in. in diam. Other sizes are made on special order.

This plate may be quickly attached from one side by sliding one end of the speed nut into the hole, centering the cover plate and tightening the screw.



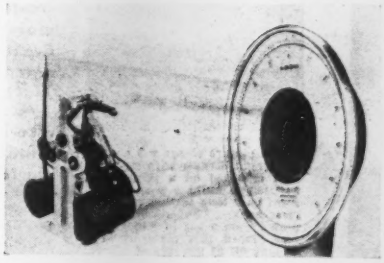
A turned-down tab on the plate keeps the speed nut from turning.—*Tinnerman Products, Inc., 2120 Fulton Road, Cleveland 13, Ohio.*

• • •

Springless Scale

Rugged, but with extreme sensitivity, the improved Kron scale has a ball bearing, springless dial mechanism of the double pendulum type. The gear sector and shafts carrying the indicator and pendulum arm weights are mounted in fixed centers. An auxiliary sector which absorbs backlash minimizes friction and wear. An adjustable, non-leaking oil dashpot compensates for shocks and temperature variation.

The scale may be used to weigh, count, batch, measure and test; its dial mechanism is interchangeable in all



Kron scales. If a special non-vibrating sector is incorporated, outside vibration

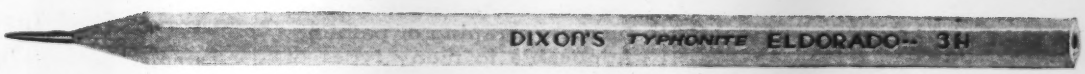
DIXON'S TYPHONITE

How Dan, the draftsman, calmed his "pencil nerves"!

Dan's "pencil nerves" were the sad result of lack of uniformity in his drawing pencils.

"Take it easy, Dan," we said, "take an Eldorado! It's uniform in all 17 degrees. Eldorado has grit-free, non-crumbling, non-feathering leads that stand up under pressure and produce dense, sharp lines. How about trying it?"

He did. And Eldorado cured his "pencil nerves", improved his work and opened his eyes. Try Eldorado! Mail the coupon below for a free Comparison Sample.



ELDORADO

Pencil Sales Dept. 227-J3
Joseph Dixon Crucible Co.,
Jersey City 3, N. J.

Gentlemen: Please send me a Comparison Sample of Typhonite Eldorado drawing pencil ..... degree.

Name.....
Address.....
City.....State.....

SAUERMAN
Long Range Machines

SAVE LABOR! SAVE POWER! SLASH COSTS!

Above picture shows a 3 cu. yd. Sauerman Scraper with its power unit mounted on a skid-frame, as used to build a gravel revetment on a long section of eroded river-bank. The scraper dug gravel from a bar in mid-stream and placed this material in a sloping fill at the rate of 130 cu. yd. an hour and at a total cost of a few cents per yard handled.

MANY excavating jobs involving hauls of 100 to 1500 ft. are simplified by using a Sauerman Power Scraper or Slackline Cableway which digs, conveys and places the materials in one operation.

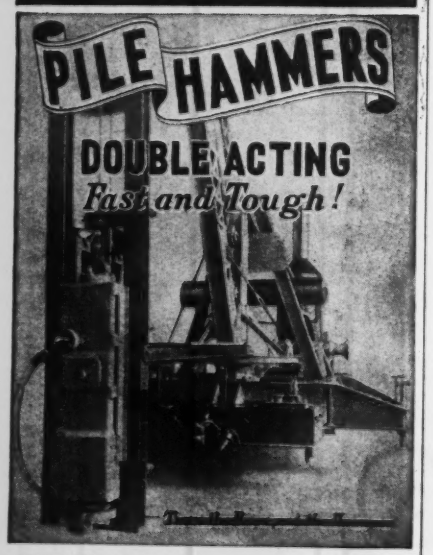
First cost of a Sauerman Machine is reasonable, maintenance expense is small and labor is reduced to a minimum. Moreover this equipment is very flexible; is readily adapted to meet any new working conditions.

A wide choice of sizes is available, offering handling capacities all the way from 10 to 600 cu. yd. an hour. Gas, electric or Diesel power.

GET THIS BOOKLET—Field data supplied by contractors, engineers, gravel producers, mine operators, etc., are part of the interesting contents of the Sauerman catalog. Write today for your copy of this useful book.

SAUERMAN BROS., Inc., 532 S. Clinton St., CHICAGO 7

UNION



EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey

STOPS TANK RUSTING
Below the Water Line
PERMANENTLY!

Rust below the water line is by far the most troublesome, expensive and destructive item of tank maintenance. But it can be eliminated completely—permanently. A proven electrolytic system (Cathodic Protection), carefully engineered to meet individual conditions, stops **all** rust formation—even removes old rust. Installed without draining the tank. Costs pennies to operate. Safe, low voltage. No paint, no chemicals. And no more rust, no more scraping or painting. Applicable to many types of submerged metal equipment. Method approved by Associated Factory Mutual Laboratories, War Department (Chief Engineer's Office) and American Water Works Assn. Write for facts — NOW.

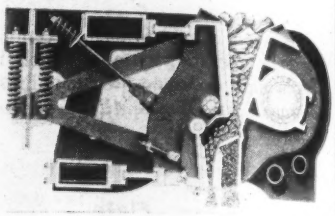
ELECTRO RUST-PROOFING *Corporation*
DAYTON 10, OHIO, U. S. A.

will be practically eliminated.—*The Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pa.*

• • •

Two-Stage Jaw Crusher

Some radically new features characterize the Ebersol crusher: There are two stages of reduction in one crusher; both jaws move in unison by one eccentric, saving jaw wear; safety springs prevent breakage from tramp iron; live screen removes fines ahead of secondary crushing chamber; very coarse and very



fine aggregates are produced at the same time; the crusher takes stone substantially the full size of the mouth opening. The main jaw has a rotary motion; the opposing jaw moves up and down on a vertical path.

The crusher is available with 10 x 20, 15 x 24, 9 x 10 and 12 x 40-in. jaw openings. The jaw faces and cheek plates are manganese steel.—*Ebersol Crusher & Engineering Co., P. O. Box 962, Lancaster, Pa.*

• • •

Universal Fittings

With double safety factors, and requiring less than half of the usual number of tightening bolts, new Universal fittings are designed for permanent installations, but may be used and reused indefinitely.

These fittings are quickly assembled, and have equalized pressure at all points of stress or strain. Every fitting is made up of two or more castings, male and female; as all parts are interchangeable, 10,000 combinations are possible.—*Universal Fittings & Scaffolding Co., Zelienople, Pa.*

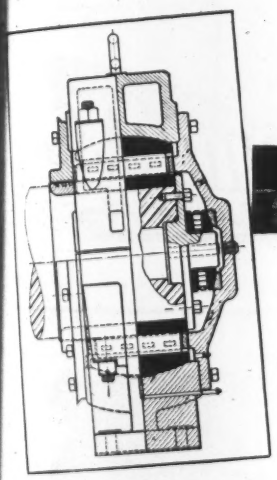
• • •

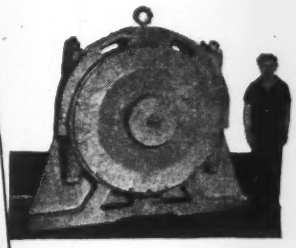
Steel Tape

Featuring easy-to-read markings that are durable, a new line of Chrome Clad steel tapes were tested under actual, severe conditions of use for months before being placed on the market.

Other outstanding characteristics of the tape, according to the manufacturer's statement, are that it is extra strong, rust resistant and will not crack, chip or peel. Cases and frames of improved types are used.—*The Lufkin Rule Co., Saginaw, Mich.*

LIFTING 3,220,000 POUNDS —ECONOMICALLY





Torrington-built sheave roller bearing shown housed and in X-section of installation. Note use of straight radial roller bearing with separate roller thrust bearings for ends of sheave shaft.

That's the year-round job eight Torrington-built sheave roller bearings help do on the 276-foot vertical lift span of Chicago's busy Torrence Avenue Bridge, shown above. Due to the efficient anti-friction performance of these specially-designed bearings, power requirements alone are cut in half. In addition, lubrication expense is considerably lowered . . . size of operating motors and machinery decreased . . . maintenance cost and time reduced to a minimum. Finally, there's no question of replacement: Torrington designed and built the bearings to last the life of the bridge . . . and they will.

That's the kind of long-term, low-cost performance Torrington Bearings give you, year in and year out, on bridges, lock gates, dams, heavy machinery . . . virtually everywhere that you're faced with heavy friction loads. In designing heavy apparatus of this sort in the future, why not consult Torrington's Bantam Bearings Division? We specialize in meeting anti-friction problems, routine or unusual, and will gladly help you meet yours.

THE TORRINGTON COMPANY • BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA

TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

Manufacturers' Publications

Fuel Saving—A new 30-page commercial standard booklet tells how to apply mineral wool in blocks, blankets, insulating cement and pipe insulation for all types of heated industrial equipment. It is claimed that it is the first high temperature insulation standard the Bureau of Standards has promulgated. It offers practical solutions to insulation problems—*Industrial Mineral Wool Institute, 441 Lexington Avenue, New York 17, N. Y.*

Flooring—A 16-page illustrated brochure describes a new permanent, acid-proof brick floor which is said not to crease, groove, chip, dust off, or require patching. It is also claimed that as it is bonded with acid-proof cement, this floor repels organic, physical and chemical attack, holds up under the cutting action of steel wheeled trucks, resists oil, water, acids, and has a crushing strength of 18,500 lbs. to the square inch.—*Belden Brick Co., Canton, Ohio.*

Dragline Buckets—A 24-page catalog tells about buckets made for heavy, medium, light and all-purpose duty. The catalog also describes fabricated dippers, and teeth for dragline buckets and dippers of all makes. Manganese steel chains, fittings and accessories for use with all dragline buckets are also catalogued. — *Daniels-Murtaugh Co., 625 C Avenue, West, Cedar Rapids, Ia.*

V-Belt Drive—An unusually complete V-belt drive catalog, with all of the required information to make correct drive selections reduced to handy charts, tables and drawings, has just been released.—*Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.*

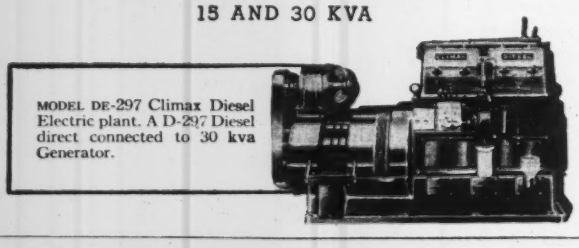
Self-priming Centrifugal Pumps—handbook by A. S. Marlow, Jr., sets forth the principles of centrifugal action, the physics of pumping and the evolution of self-priming centrifugal pumps. It is scientific but illustrations and simple language make it valuable for all engineers. It is said that it is to be used as a textbook and reference work in several engineering schools. Besides giving basic engineering information, the booklet tells the difference between the types of self-priming centrifugals, points out where self-primers can be used with best effect, and details how to install and care for them.—*Marlow Pumps, Ridgewood, N. J.*

Grid Flooring—Described and illustrated in a bulletin are various types of steel grating, including flooring and stair treads together with diagrams and data on the various types and sizes. Features of the product, according to the manufacturer, include maximum strength at minimum weight, maximum open area, complete safety, adaptability and maintenance economy.—*National Machine and Foundry Co., 312 Sixth Avenue, Pittsburgh 22, Pa.*

50th Anniversary—A human interest illustrated booklet tells the story of a typically American manufacturing company which has won great success in its field.—*The Cleveland Pneumatic Tool Co., Cleveland 5, Ohio.*

Sewage Treatment Equipment—A booklet describes and illustrates the following sewage works equipment: floating covers, sprinkling filter units, rotary distribution, alternating siphons, screening digesters, clarifiers, twin tank controls, sludge pumps, flame traps, and waste gas burners.—*Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago.*

Now BIG DIESEL
ECONOMY
in SMALL DIESEL Electric Plants
15 AND 30 KVA



MODEL DE-297 Climax Diesel Electric plant. A D-297 Diesel direct connected to 30 kva Generator.

CLIMAX Diesel Engines—direct connected to generators in Climax Generator Sets—operate on cheap, standard low grade fuel oil—supply abundant electric power and light at less than 1c per kwh.

In two sizes—15 and 30 kva—these sets supply electricity where purchased power is costly or unavailable. They are used for emergency or auxiliary service to reduce demand charges, and to supply *primary* power to rural homes, industrial plants, boats, hotels, and construction and oil field projects.

Engines are 2 and 4 cylinder full Diesels, with maximum ratings of 22 and 44 h.p. at 1200 rpm. Safe, dependable, easy to operate. For complete information and specification bulletin, write Climax Engineering Company, Clinton, Iowa.

climax
GENERATING SETS
Builder of Climax BLUE STREAK and DIESEL ENGINES
CLIMAX ENGINEERING COMPANY

PHIL-DUMP TRAILERS
now ride on air!

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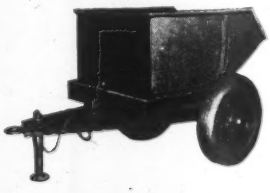

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Portable Hangars

erected "on the double"

The Yanks make new landings, and capture or build an airfield. Now the job is to provide a hangar for the big bombers, and do it in the shortest possible time.

Skids are hauled up, containing bundles of steel sections, bolts, and wrenches. The members, each light enough to be handled by one or two men, are bolted together to form three-hinged arches, 39 feet high and about 148 feet across.

Gin poles set up the arches, and connect them together with sway frames and purlins. Steel sheets serve as roof covering and tarpaulins as end walls.

Bethlehem is now fabricating 4400 tons of steelwork for 80 of these portable hangars. Besides being demountable, hangar sections are interchangeable—so that fabrication of them, while not calling for unusual tolerances, requires that standard work practices be carried out with considerable exactitude.

Fabricated steel for portable hangars and for temporary bridges; parts and subassemblies for warships and cargo vessels—these are three out of many examples of the diversity of work to which Bethlehem, largest steel-construction organization in the world, is applying its facilities and experience during these years of war.

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BETHLEHEM STEEL ★

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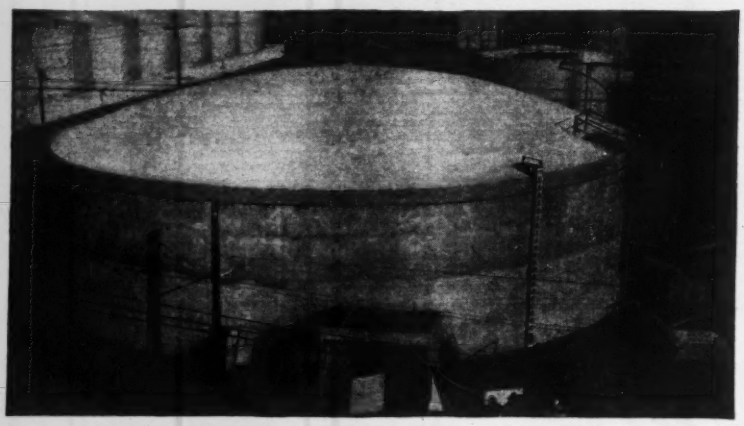
"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



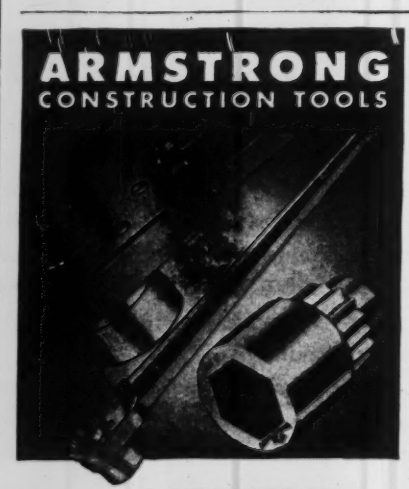
PRE-STRESSED "GUNITE" WATER TANK

The water storage tank shown above was built by us of "GUNITE" in 1944. The wall and dome ring girder are pre-stressed. The dome roof is also "GUNITE." It is 90' in diameter and 25' deep, and is bottle tight.

We have built scores of similar pre-stressed tanks and stand-pipes for the storage of various liquids, and also pre-stressed silos for the dry storage of chemicals.

Our 74 page bulletin 2200 describes dozens of "GUNITE" jobs of many types. Write for your copy.

MANUFACTURERS OF THE "CEMENT GUN"



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DROP FORGED CONSTRUCTION RATCHETS

The ARMSTRONG Reversible Ratchet Construction Wrenches are made of steel thruout—the Ratchets are drop forged, the Nut Socket machined from special analysis bar steel. All parts except the handle are hardened. The spindle of the Ratchet is of "wide open" design—permits bolt to pass thru the Ratchet so that nuts can be run any distance along bolt and securely set with one setting. 24" or 36" Ratchets take square or hexagonal sockets for nuts of from 1" to 2⅛" dia. or 1⅛" to 3⅛" dia., respectively.

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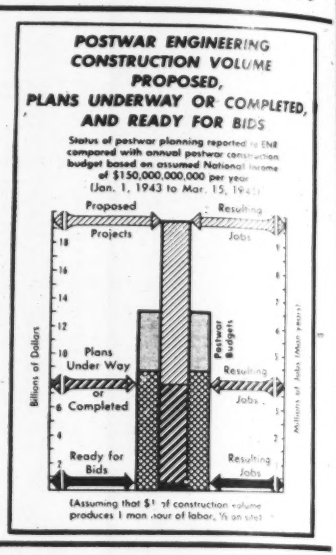
POSTWAR PROJECTS


POSTWAR ENGINEERING CONSTRUCTION VOLUME PROPOSED, PLANS UNDERWAY OR COMPLETED, AND READY FOR BIDS
Status of postwar planning reported by ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year
(Jan. 1, 1943 to Mar. 15, 1943)
Proposed Projects
Resulting Jobs
Billions of Dollars
Millions of Jobs (Man-years)
Plans Under Way or Completed
Postwar Budget
Ready for Bids
Resulting Jobs
(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

Projects proposed for postwar construction have been published in these columns since January, 1943, as they have been reported to Engineering News-Record.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

If you or your community are working on projects that have not yet been included in this "postwar reservoir," please send us an itemized list and description of them, including estimated cost and the names of the engineers who are at work on the plans. Then as you watch the arrows climb you will know that you and your community are contributing to the success of the NUMBER ONE JOB of preparing for peace.

Address your projects list to Manager Business News Department, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

MINIMUM SIZE OF PROJECTS PUBLISHED

Public Works	$25,000
Industrial Buildings	40,000
All Other Buildings	150,000

WATER SUPPLY

PROPOSED WORK

Calif., Yuba City—City, City Hall, curbs, gutters, walks, $27,199; street paving $109,033.

Conn., Greenwich—Town, W. M. Peck, first selectman, Town Hall, watermains and placing hydrants, $100,000. Financing not provided.

Wash., Sedro-Woolley—State Dpt. Finance, Social Security Bldg., Olympia, water supply sys., for Northern State Hospital, $100,000. Financing not provided.

W. Va., Wheeling—City, City Hall, 40,000 lin. ft. 12 in. c.i. Class C, B & S water pipe, hydrants, valves, fittings and street restoration, $225,000. S. Fox, supt. Water Div., Dpt. P. Wks.

PLANS UNDER WAY

Minn., Menahga—City, O. L. Buck, clk., furnishing, installing watermains, $15,000. Hitchcock & Estabrook, 521 Sexton Bldg., Minneapolis, consult. engrs.

★**Okla., Seminole**—City, City Hall, plans completed water supply, consisting impounding reservoir, filter plant, pump station, watermains and storage facilities, $650,000. Financing not provided. V. V. Long & Co., Colcord Bldg., Oklahoma City, consult. engrs.

★**Tex., Corpus Christi**—City, City Hall, plans 10% completed water sys. expn. incl. pump. and filtration facilities, ground and elevated storage facilities, large mains running from pump. plant, distr. lines throughout city, etc., $7,500,000; concrete and earth reservoir on Nueces River, $5,000,000. Financing not provided. Myers & Noyes, Furman Bldg., consult. engrs. A. McCormick, City Hall, city engr. G. S. Moore, City Hall, plan engr. CD 11/5/43—ENR 11/11/43.

★**Tex., Eastland**—City, City Hall, plans completed water supply sys., $300,000. Financing not provided. J. E. Ward, 548 Harvey-Snider Bldg., Wichita Falls, consult. engrs. CD 5/14/43—ENR 5/20/43.

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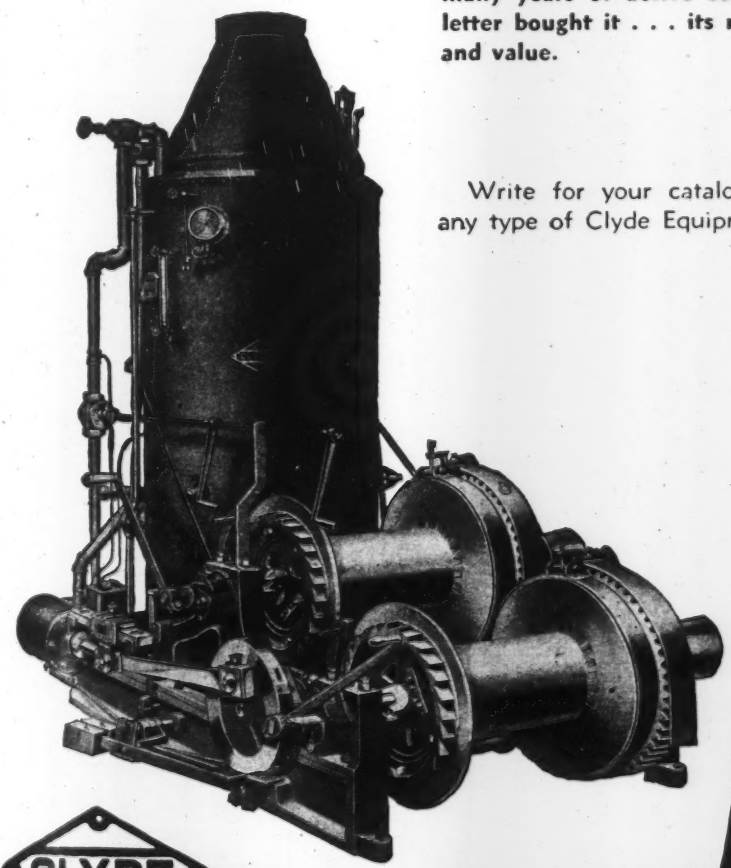

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POSTWAR PROJECTS (Cont'd.)

Tex., El Paso—El Paso Co. Water Control & Imprvt. Dist. 1, El Paso, plans completed fresh water supply sys. $275,000. Financing not provided. Frazer & Benner, 705 El Paso, National Bank Bldg., consult engrs. CD 5/14/43—ENR 5/20/43.

Tex., Mission—City, City Hall, plans 40% completed WW imprvs., incl. 500,000 gal. elevated storage tank, enlarging storage reservoir, pump, plant and filtration, distr. lines, $170,000 bond election Mar. 17 for same. H. W. Ewing, Mission, consult. engr.

Va., Marion—Town, Town Hall, plans 75% completed exten. watermains of municipal sys., relating mains that interfere with other construction, enlarging certain lines which have inadequate volume, $22,500. H. R. Knight, P. O. Box 307, engr.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Hollister—City, City Hall, exten., imprv. storm sewerage sys. $30,000.

★ **Calif., Monterey**—City, City Hall, sewage treatment plant. $772,000.

Calif., Pacific Grove—City, City Hall, outfall and intercepting sewers, $50,000; sewage disposal plant, $250,000. CD 2/8—ENR 2/22.

Calif., Yuba City—City, City Hall, sewage treatment plant, $77,000; sanitary sewer exten., $39,934; storm sewer exten., $22,296.

★ **Tenn., Fountain City**—Fountain City Sanitary Dist., Fountain City, sanitary sewerage sys., disposal plant. $1,500,000. Financing not provided.

Wis., New Glarus—Village, E. Figi, clk., sewage treatment plant. $25,000. Financing not provided.

Alta., Red Deer—City, R. S. Gillespie, comr., City Hall, 10,000 ft. exten. sewerage sys., about 10,000 ft. mostly 6 in. watermains, and 9,000 ft. steel mains replaced. About $55,000.

PLANS UNDER WAY

★ **Calif., Oakland**—City, City Hall, storm sewer in Fairfax Ave., E. 16 and E. 17 Sts., $17,000; Brann St., $5,000; Rosedale Ave., $13,500; E. 22 St., E. 23, E. 24, E. 25 and 27 Aves., $20,000; E. 18 St. and 8 Ave., $51,590; 28 St., $132,500; 38 St., $5,000; Telegraph Ave., from 21 to Sycamore Sts., $14,000; 78 and 76 Aves., $28,000; in portions of Sunnyside St., Voltair, 101, 105 and Breed Aves., $43,500; Hegenberger Rd. and 77 Ave., from Elmhurst Creek northerly to Rudsdale St., $33,000; Holly St., from Arroyo Viejo Creek to 82 Ave., $5,600; Millsmont Dist. from intersection of Hillmont Dr. and Delmont Ave. to Mountain Blvd., in vicinity of Altamont Ave., $34,000; Bona St., $6,500; 23 Ave., commencing at Estuary to E. 17 St. and 23 Ave. intersection, $130,500; 14 Ave., $130,000; Creek Rd., Holman Rd. and Hampel St., $12,100; 8 Ave., $165,000; 20 St. from Lake Merritt to Telegraph Ave. and in Harrison to Webster Sts., from 20 to 13 Sts., $60,000; Glen Echo Creek in 26 and Harrison Sts., from 23 to Valdez Sts., $130,000; completing storm sewerage sys. 23 Ave., from E. 17 to E. 26 Sts., and branch in Highland Ave., $43,000; 8 Ave., $56,000; Alcatraz-Shattuck storm sewerage sys., $137,000; Elmhurst Creek storm sewer, from E to Blaine Sts., $179,000; supplemental storm sewers in Stonehurst Dist., $20,000; Lion Creek outlet from East Creek Slough to W.P. right of way, $65,000; Peralta Creek culvert adjacent to Hamilton Junior High School, $52,000; culvert in Lake Merritt outlet channel, $186,500; imprv. West Oakland drainage sys., $200,000; pump. plant for West Oakland drainage, $60,000; exten. 34 St. storm water outfall, $245,000; exten. Project 26 in 45 and 51 Sts., Shafter and Manila Aves., to Bway. with branches, $70,000; reconstructing defective sanitary sewer in Peralta St., $5,000; Market St., from 16 to 22 Sts., $5,500, and from 22 St. to San Pablo Ave., $13,000; reconstructing 22 St. outfall sewer westerly of Wood St., for storm water purposes, $521,000; storm water outfall in 34 St. from the Bay to Haven St. supplementing original 36-St. outfall built in 1903, $1,298,000; storm conduit in Patton St., $5,000; Arroyo Viejo Creek culvert and wall at 81 Ave. and Dowling St., $20,000; Arroyo Viejo Creek channel in 74 Ave. from San Leandro to E. 14 Sts., $144,500; main "Stonehurst Drainage," $240,000; replacing undersize culverts in Arroyo Viejo Creek near intersection of Mountain Blvd. and Golf Links Rd., $34,800; outlet for Arroyo Viejo Creek from East Creek Slough to San Leandro St., $100,000; outlet for Lion Creek, from Damon Slough to San Leandro St., $50,000; sanitary relief sewer in Seminary Ave., from San Leandro to E. 14 Sts., $12,000; Fruitvale Ave. from Foothill Blvd. to Pleasant St., $37,500; reconstructing defective storm sewer in right of way adjacent to MacArthur Blvd. from 55 Ave. to Buell St., $18,500; settling basins in Trestle Glen Creek, $10,000; in Glen Echo Creek near Grand Ave., $15,000; replacing defective and inadequate storm sewer in Upper Park Blvd., $82,500; supplemental storm sewer for protection of Park Blvd. [illegible] $83,000; constructing sanitary sewer [illegible] Grand and Staten Aves., $6,500; reconstructing defective sanitary sewer in Fairview [illegible] and Warfield Aves., $7,500; reconstructing defective culvert in Glen Echo Creek at 29 St., $42,000. W. N. Frick, City Hall, city engr.

★ **Ind., Anderson**—City, V. [illegible] city engr., and R. R. Baxter, disposal plant mgr., enlarging sewage plant, $137,500; relief sewers, $132,000; outlying sewers and [illegible] $266,800; inside sewerage sys. [illegible] $107,000. Financing not provided. Greeley & Hansen, 6 N. Michigan Ave., Chicago, Ill., consult. engrs. CD 5/24—ENR 6/1.

★ **Mass., Taunton**—City, Bd. Sewer Comrs., Taunton, plans completed sewage treatment plant. $500,000. Financing not provided. Fay Spofford & Thorndike, 11 Beacon St., Boston, archts. CD 3/31—ENR 4/29.

Minn., Menahga—City, O. L. Buck, clk., furnishing materials, installing sanitary sewer lines. $25,000. Hitchcock & Estabrook, 531 Sexton Bldg., Minneapolis, consult. engrs.

Minn., Wadena—City, J. H. Ehlen, clk., storm water sewerage sys. $60,000. Hitchcock & Estabrook, 531 Sexton Bldg., Minneapolis, consult. engrs.

★ **N. J., Gloucester City**—City, City Hall, preliminary plans under way sewage disposal plant. $500,000. Andrews & Gleseke, Inc., 936 Hudson St., consult. engr. CD 8/25—ENR 9/7.

Okla., Meeker—Town, Town Hall, plans 5% completed sanitary sewerage sys. and sewage disposal plant, $42,000. Land rights not cleared, financing not provided. H. T. Lawrence, 1802 N.W. 21 St., Oklahoma City, consult. engr.

Pa., Collingdale—Collingdale Boro, E. C. Rohland, secy., sewage disposal plant. Over $25,000. Damon & Foster, Sharon Hill, consult. engrs.

Pa., Northampton—Northampton Boro, Municipal Bldg., altering primary treatment sys. to complete treatment, $15,000-$25,000. Financing not provided. J. H. Immel, Municipal Bldg., engr. CD 2/19.

Pa., Titusville—City Council, City Hall, addnl. sanitary sewers. $40,000. J. F. Fay, City Hall, city engr.

S. D., Custer—City, J. F. Boyles, aud., City Hall, imprv. sewage plant, incl. primary intermediate and final sedimentation, re-circulation, conversing existing sedimentation units into heated digestor and auxiliary storage, addnl. sludge dry beds. $30,000. J. Otavin, Rapid City, consult. engr.

Tex., Galveston—Island Water Control & Imprvt. Dist. 6, Courthouse, plans under way sewerage sys. $125,000. Financing not provided. J. J. Rady, Insurance Bldg., Fort Worth, consult. engr.

Tex., Mission—City, City Hall, plans 40% completed sanitary sewerage sys. imprvs., collection lines, increasing pump. capacity, enlarging disposal, etc. $80,000 bond election Mar. 17 for same. H. H. Ewing, Mission, consult. engr.

Tex., Paris—City, J. W. Barnes, mayor, City Hall, plans 50% completed sanitary sewers, treatment plant. $150,000. W. F. Hicks, City Hall, city engr. CD 4/21—ENR 5/4.

Va., Marion—Town, Town Hall, plans 30% completed storm sewers through business section, sanitary sewers exten. to outlying, thickly populated areas. $53,203. Land rights not cleared, financing not provided. H. R. Knight, P. O. Box 307, engr.

Wyo., Cheyenne—City, City Hall, sewage treatment and intercepting sewer. $250,000. Some preliminary work done. H. G. Watson, City Hall, city engr.

BRIDGES

PROPOSED WORK

Calif., Ukiah—Mendocino Co., Court House, Ukiah, bridge at Chamberlain Creek on Willits-Ft. Bragg Rd., $12,000; Pickrell Creek Bridge, $6,500; Hellesoe Bridge, $7,000; Frost Creek Bridge, $4,000; bridge on Rd. 33, No. 3, $6,500; Tomki Bridge, $6,500.

Maine—State Hy. Dpt., Augusta, concrete, steel bridge between Old Town and Indian Island. To exceed $100,000.

Mass., Barnstable—Town Bd. Selectmen, Town Hall, Grand Isle Bridge. To exceed $50,000.

Mass., Palmer—Town, Bd. Selectmen, Town Hall, concrete, steel Three Rivers and Burleigh Bridges. To exceed $25,000 each.

★ **N. J., Camden**—State Bd. Pub. Utilities Comn., 1060 Broad St., Newark, 3 overpasses on Penn.-Reading Seashore R. R. line, for grade crossing elimination, $750,000.

★ **N. J., Haddonfield**—State Bd. Pub. Utilities Comn., 1060 Broad St., Newark, 5 overpasses on Penn-Reading, Seashore R. R. line, for grade crossing elimination, $1,600,000.

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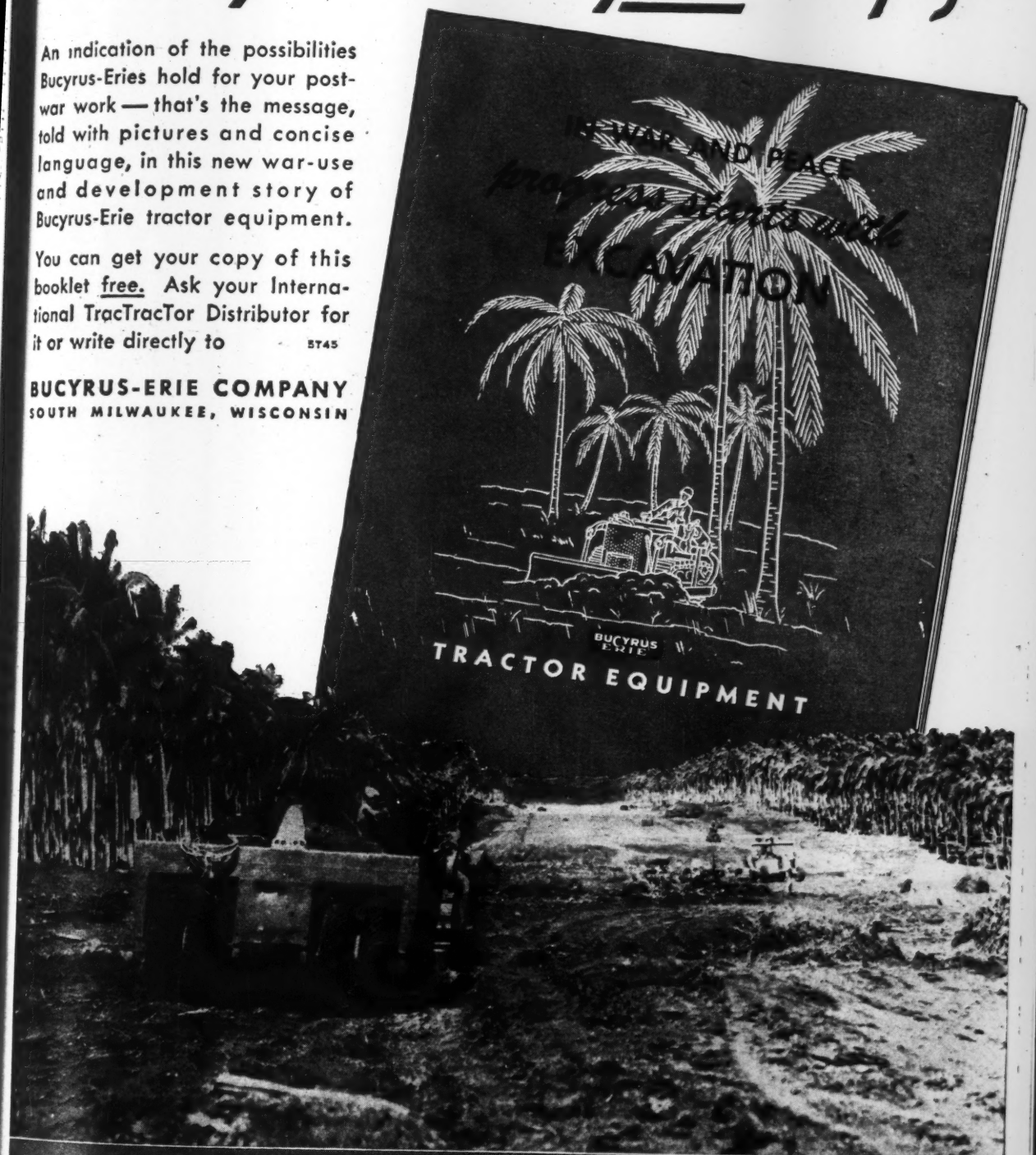

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POSTWAR PROJECTS (Cont'd.)

N. J., Hamilton—State Bd. Pub. Utilities Comn., 1060 Broad St., Newark, overpass on Penn. R. R., for grade crossing elimination. $160,000. Financing provided.

N. J., Harlingen—State Bd. Pub. Utilities Comn., 1060 Broad St., Newark, overpass on Reading R. R., for grade crossing elimination. $160,000.

★ **N. J., Plainfield**—State Bd. Pub. Utilities Comn., 1060 Broad St., Newark, 3 overpasses on Penn. R. R., for grade crossing elimination. $1,250,000. Financing available.

N. J., Woodlynne—State Bd. P. Utilities Comn., 1060 Broad St., Newark, overpass on Penn. and Reading Seashore R. R. Line. $350,000. Financing available.

★ **Washington**—State Hy. Dpt., C. E. Hickey, dir., Olympia, bridge across Cowlitz River, at Kelso, Cowlitz Co. $800,000. Financing not provided.

PLANS UNDER WAY

Calif., Modesto—City, City Hall, bridges, $50,000. Financing now planned; bridges $300,000, railroad grade separations $375,000. Financing not planned. F. Rossi, City Hall, city engr.

★ **Calif., Modesto**—Stanislaus Co., Court House, plans under way Crows Landing bridge, $159,900; Empire Bridge, $108,200; Grayston Bridge, $167,000; 80 bridges over canals and creeks, $160,300; bridge on Santa Fe Ave., Merced Co. line to San Joaquin Co. line, $91,300. G. D. Macomber, Modesto, engr.

Connecticut—State Hy. Dpt., Wm. J. Cox, comr., State Office Bldg., Hartford, steel beam, concrete, 2 track bridge over highway, at Vernon, $25,000. Financing not provided. L. G. Sumner, State Office Bldg., Hartford, engr.

★ **N. Y., Brooklyn**—Dpt. Parks, Arsenal Bldg., Central Park, 61 St. and 5 Ave., New York, Zone 21, plans completed underpass and overpass, Ocean Parkway at Caton Ave. and Fort Hamilton Parkway, $1,135,000. Financing not provided. Waddell & Hardesty, 101 Park Ave., New York, Zone 17, consult. engrs. CD 3/6—ENR 3/23.

N. Y., New York—President Bronx Boro, 581 Grand Concourse, Zone 58, plans completed grade separation at Castle Hill Ave. and Bruckner Blvd., Proj. PX-53-C, $454,128. Financing not provided. J. Feld & J. V. Timoney, 103 Park Ave., Zone 17, consult. engrs. CD 10/20—ENR 11/2.

Tenn., Knoxville—Knox Co., G. Bearden, hy. comr., Court House, plans under way bridges, viaducts and grade separations, $249,000. Financing not provided. B. Acuff, Anderson and Wray Sts., co. engr.

Wyo., Cheyenne—City, City Hall, railroad grade separation and truck route detour from business area. $300,000. H. G. Watson, City Hall, city engr.

Ont., Galt—Municipality, Galt, railway crossing elimination. $75,000. E. M. Griffith, 22 Crambie St., engr.

READY FOR BIDS

★ **Calif., Sacramento** — Sacramento Co., Court House, plans completed bridge on Galt-New Hope Rd., $81,000; Twitchell Island Bridge, $93,000; several small bridges on Michigan Bar-Ione Rd., $98,900; Millers Ferry bridge across Mokelumne River north fork Walnut Grove, $93,000; Elk Grove-Florin bridges, $33,200; Reese and Frasinetti Bridges, Florin to Gerber Rd., 2 bridges, $28,500; Bruceville bridges between Sheldon Rd. and Bruceville, $32,000; Lambert Sta. Rd. bridges, from Lower Stockton to River Rd., $75,500; Elverta Rd. bridges, Garden Highway and Driver Rd., $32,300; trestle at El Camino Ave., North Sacramento and Air Depot Dock Rd., $27,000; Dillard-Sloughhouse Rd., Sloughhouse and Stockton Blvd. bridges, $40,000; bridges, McKenzie Rd., Ione Hy. and Arno Rd. bridges, $42,000; Madison Ave. bridge, Manzanita Ave. and Hy. 99, $18,600; bridge on Arno Rd. between Stock-

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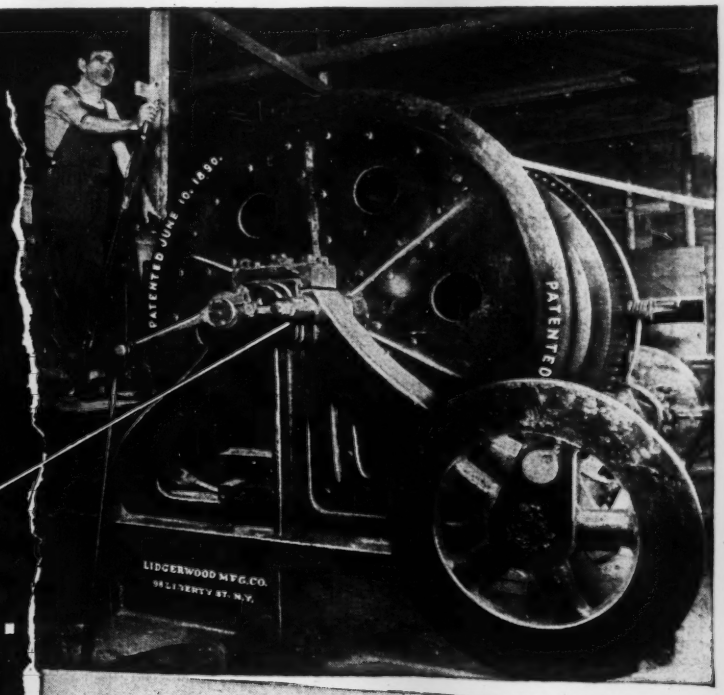

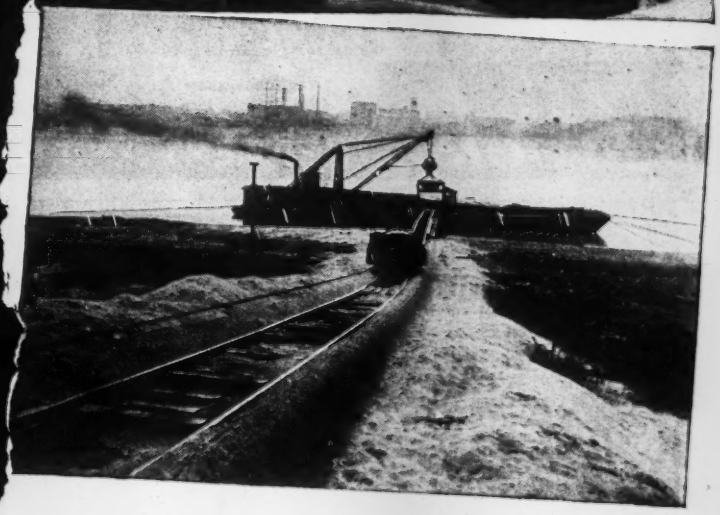

50 YEARS of continuous performance should earn this LIDGERWOOD Slope Hoist a citation for day-in day-out devotion to duty! Originally built for steam operation before the turn of the century, it has been converted to electric motor operation and is *still* seeing daily heavy service, handling the output of a large mid-western gravel plant.

LIDGERWOOD Hoists, correctly designed and engineered, are job-tested and backed by more than 71 years of "Know How"—your guarantee of long years of dependable, efficient operation.

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MANPOWER SHORTAGE

Fewer drivers needed when a Load Lugger and buckets replace several ordinary trucks.

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Load Luggers save on equipment costs because fewer trucks are required for a given job.

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This modern material handling unit with detachable buckets can be mounted on any standard truck chassis. It is the answer to quarry operator's problems of hauling rock to feed crushers, stripping overburden, road building, construction jobs and many other operations where loading is done by hand.

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UPKEEP EXPENSE

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POSTWAR PROJECTS (Cont'd.)

ton Blvd. and Alta Mesa Rd., $11,700; bridges, Gerber Rd. between Stockton Blvd. and Sheldon-Sloughhouse Rd., $7,600; Dry Rd. bridges, McClellan Field and Northcounty line, $12,600; E. Stockton bridges, Deer Creek Rd. and Watt Ave., $12,800; Antelope East Bridges, Antelope and Auburn Rd., $9,300; Lemon Hill Rd., Stockton Blvd. and Power Inn Rd. bridges, $5,100; Indiana Ave., Old Marysville Rd. and North Grant Line Rd. bridges, $24,700; Hurley Way and Ave. and Norris Ave. bridge, $5,000; Wilson Ave. and Old Marysville Rd., Marysville Blvd. and north county area bridges, $12,100; Elder Creek, Franklin Blvd. and Jackson Highway bridges, $9,500; Calif. Vineyard Rd., Stockton Blvd. and Sheldon-Sloughhouse Rd. bridge, $5,200; Christensen Rd., Galt-New Hope Rd. and Wilder-Ferguson Rd. bridges, $9,500; Mariposa Ave., Olive Ave. and Twin Oaks Ave. bridge, $21,000; Havel Ave., Fair Oaks and north county bridge, $5,000; Galt and West Galt and Christensen Rd. bridges, $7,600; Cottage Way, 20 St. and Walnut Ave. bridges, $12,300; Osage-Orange, Florin Rd. and Jackson Hy. bridge, $13,300; Franklin Ave., Marrow Ave. and Arcade Blvd. bridge, $5,100; Alta Mesa Rd., Ione-Highway and Dillar-Sloughhouse Dist. bridges, $12,400; Gum Tree Rd. and South Ave., McClellan Field and North Grant Line Rd. bridges, $7,300; Meadowview Farm Rd., Franklin Blvd. and Freeport Blvd. bridge, $15,700; Bottimore Rd., Lone Hy. and north and east for about 5 mi. bridge, $14,000; Herald East, Ione Hy. and Eastern area of county bridges, $5,600; A. Keifer, Court House, acting co. engr. CD 2/15—ENR 3/8.

STREETS AND ROADS

PROPOSED WORK

Calif., Redding—Shasta Co., Court House, Redding, realign and construct 13 mi. Dersch Rd., $72,000; Dana Rd., $40,000; 6 mi. Bala Vista-Pola Cedro Rd., $48,000; 12 mi. Balls Ferry Red Rd., $66,000; 12 mi. Whitmore Rd., $90,000; 39 mi. Harrison Gulch Rd., $100,000.

Calif., Ukiah—Mendocino Co., Court House, Ukiah, imprv. Willits Rd., $62,500; Road 20, Bell Springs, $5,000; Willits Valley roads, $15,000; realignment 9.3 mi. from Dos Rios to Covelo, $40,000; Albion Ridge Rd., $21,000; Road 19, $5,000; oil 16 mi. Road 17-A, $16,000.

Calif., Yuba City—City, City Hall, ½ mg. water tank, $60,000; watermain exten., $36,422.

Nev., Winnemucca—Humboldt Co., Court House, curbing, guttering, $87,500. H. P. Berk, Winnemucca, supt. Streets.

Washington—State Hy. Dpt., Olympia, C. E. Hickey, dir. constructing Primary State Hy. 12 from Grays River to Skamokawa, Wahkiakum Co. $300,000. Financing not available.

Washington — State Hy. Dpt., Olympia, highway from Ritzville to Ewan, Adams Co. Financing not provided.

PLANS UNDER WAY

Calif., Modesto—Stanislaus Co., Court House, Modesto, plans under way W. Main Rd., Turlock to Patterson, $83,800; impvt. Santa Fe Ave., Merced Co. line to San Joaquin Co. line, $114,700; Crows Landing Rd., Modesto to Crows Landing, $98,000; Hickman-Valley Home Rd., $89,650; Whitmore, Hickman and Geer Roads, from U. S. 99 Hy. to Hickman and Turlock, $106,400; Carver Rd., U. S. 99 Hy. to State Route 11, $20,400; McHenry Ave., State Route 13 to Stanislaus River, $9,700. G. D. Macomber, Modesto, engr.

Minn., St. Michael—Village, Mrs. R. Hartman, clk., plans under way paving main streets. $90,000. Hitchcock & Estabrook, 531 Sexton Bldg., Minneapolis, consult. engrs.

★ **Neb., Grand Island**—Hall Co. Hy. Dpt., 2600 W. 2 St., plans 10% completed 6-year imprv. plan, incl. road grading, stabilization, graveling, oil surfacing, various types bridges and materials. $600,000. L. E. Rudd, Grand Island, co. engr.

★ **New York**—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, preliminary plans completed Brooklyn Connecting highway between Kent Ave. and Kosciusko Bridge, Brooklyn, King Co., $8,897,000. Financing not provided. Madigan & Hyland, 24-06 41 Ave., Long Island City, consult. engrs.

★ **N. Y., New York**—Dept. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., Zone 21, plans completed reconstructing Mosholu Parkway from Bronx River Parkway to Sedgwick Ave., Proj. P-73, $1,762,500; Pelham Parkway reconstruction from Bronx River Parkway to Eastern Blvd., $2,325,000. Financing not provided. G. D. Clarke, 10 Rockefeller Plaza, New York, Zone 20, consult. engr.

O., St. Clairsville — Belmont Co. Comm., St. Clairsville, plans completed grading, bituminous concrete on waterbound macadam paving, $65,000; grading, traffic bound surfacing $30,000, grading, structure and traffic bound surfacing reservoir crossing and approaches $60,000, plans 75% completed, grading, structures and traffic bound surfacing $35,000, land rights not cleared, financing not provided; plans 75% completed, grading, structures, traffic bound

Cooling Tower on Wheels

Completed Foster Wheeler built cooling tower car ready for coupling to rest of power train.

Cooling tower framing with outer sheathing partly applied. Note TECO Connectors are used for joining framing at corners and diagonals. Tower built by Foster Wheeler Corporation, New York.

A mobile power and light plant for use in war devastated areas was needed. General Electric Company engineers designed a mobile train to meet the situation. These trains are able to generate power independent of local sources of water, fuel or other necessities. Units of various capacities are built to meet local conditions. One type, the 3000 k.w. train, is equipped with three cooling tower cars with a capacity of 5000 g.p.m. A 1000 k.w. train has but one cooling tower car.

These cooling towers are pre-fabricated by the Foster Wheeler Corporation with TECO Connectors; match-marked, dis-assembled and shipped abroad, where they are quickly put together again.

In war work or in post-war planning, TECO Connectors play a vital part in timber construction jobs in all fields.

Watch for announcement of the newest TECO book—The Forest Industries Blaze New Trails.

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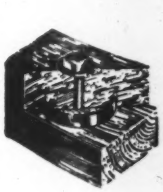

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• FLEXIBLE PNEUMATIC VIBRATOR

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Upsetting is practically eliminated in mounting. Handles allow complete unit to be easily carried.

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POSTWAR PROJECTS (Cont'd.)

surfacing **$26,000**, plans 50% completed **$80,000**, financing not provided. G. C. Travis, Court House, co. engrr.

Okla., Vinita—City, City Hall, plans 15% completed addnl. street pavement. **$40,000**. Legal obstacles to be overcome and financing not provided. W. R. Holway, 302 E. 18 St., Tulsa, consult. engr.

★**Tenn., Knoxville**—Knox Co., G. Bearden, hy. comr., Court House, plans under way, highways, roads and streets, **$1,025,000**. Financing not provided. B. Acuff, Anderson and Wray Sts., co. engr.

Tex., Center—Shelby Co., D. Davis, judge, plans 50% completed farm-to-market roads, **$50,000**. Financing available. CD 2/12—ENR 2/22.

Tex., Corpus Christi—City, City Hall, plans under way asphalt widening, straightening Anges St., 64 ft. wide, **$150,000** or more. Financing not provided. A. McCormick, City Hall, city engr. G. S. Moore, c/o City, plan engr. CD 4/21—ENR 5/4.

Tex., Palo Pinto—Palo Pinto Co., Palo Pinto, plans completed reworking approx. 40 mi. roads, incl. dirt work, drainage structures, base materials and low cost bituminous surfacing, near here. **$25,000**. Financing not provided.

Va., Marion—Town, Town Hall, plans 75% completed rebuilding of Main St. (U. S. Route 11), incl. excav., base and surface and curb and gutters, **$64,069**. H. R. Knight, P. O. Box 307, engr.

Washington—State Hy. Dpt., C. E. Hickey, dir., Olympia, plans under way approach to Washington State College Stadium, **$130,000**; CD 2/13—ENR 3/8; approach to University of Washington Campus, involving underpass and widening of streets, King Co., **$395,000**. Financing provided.

Wis., Kenosha—H. H. Herzog, comr. Hy. Dpt., Court House, plans 90% completed road oiling, gravel surfacing, soil cement and regular maintenance work. **$200,000**.

READY FOR BIDS

Calif., Sacramento—Sacramento Co., Court House, plans completed 3.5 mi. Howe Ave., **$128,180**; 2.5 mi. Michigan Bar-Ione Rd., **$167,000**; 2 mi. Elk Grove-Florin Rd., **$37,200**. A. Keifer, Court House, acting co. engr. CD 2/15—ENR 3/8.

EARTHWORK, WATERWAYS

PLANS UNDER WAY

★**Arkansas**—U. S. Eng., 300 Bway., Little Rock, plans under way imprv. levees on south bank Arkansas River (head of Fourche Island to Pernnington Bayou), **$1,123,000**; imprv., enlarging levees on south bank of Arkansas River, Tucker Lake, **$308,000**, both Jefferson Co.; levees in Conway Co. Levee Dists. 1, 2 and 8, **$1,005,000**; imprv., enlarging levees in Dist. 6, **$371,000**; in McLean Bottom section, **$517,000**, all Conway Co.; in Crawford Levee Dist., **$1,830,000**; imprv., enlarge levee, **$329,000**, both Crawford Co.; imprv. levees in Little Rock, **$575,000**; imprv. Roland Drainage District Levees, **$339,000**, both Pulaski Co.; imprv., enlarging levees, Sebastian Co., **$898,600**; in Pope Drainage Dist. 1 and Conway Co. Levee Dists. 3 and 7, Pope Co., **$1,458,000**; in Dardanelle Drainage Dist., Dardanelle, **$216,000**. CD 12/24/43—ENR 1/13/44.

Tex., Corpus Christi—City, City Hall, plans 10% completed drainage. Over **$100,000**. Financing not provided. G. S. Moore, City Hall, plan. engr.

PUBLIC BUILDINGS

PROPOSED WORK

★**Ark., Alexander**—State, Little Rock, bldgs., at Negro Tuberculosis Hospital, **$580,412**.

Ark., Benton—State, Little Rock, addnl. bldgs. at State Hospital Colony. **$300,000**.

★**California**—State Dpt. of Architecture, P. Wks. Bldg., Sacramento, kitchen, commissary and feeding unit, **$378,000**; bldgs. replacing main bldg., wards, and Wards 8, 10, D & E, **$880,000**; administration and receiving units, **$400,000**; hospital ward addn., **$190,000**; auditorium and library, **$69,600**; roads, landscaping and ground imprvs., **$70,000**; street lighting sys. addns., **$20,000**; ice plant, incl. shelter, **$16,000**; warehouse for canned goods, etc., **$20,000**; main electric distr. sys., imprvs. and expans., **$53,000**, all at Mendocino State Hospital.

★**Calif., Monterey**—City, City Hall, library, **$112,000**; jail, **$86,000**; auditorium, **$416,000**; natatorium, **$193,000**; public comfort station, **$18,000**.

Calif., Ukiah — Mendocino Co., Court House, Ukiah, county jail and courthouse bldg., **$250,000**; county hospital and tuberculosis ward and detention home, **$100,000**.

Conn., Stamford—State, Office of the Comptroller, State Office Bldg., Hartford, 1 story, bsmnt., 65x120 ft., brick, stone James Melton Museum, Den Rd. **$155,000**. Financing not provided.

Me., Augusta—State Bldg. Dpt., State House, garage. **$150,000**. Financing not provided.

Me., Eastport—State Health & Welfare Dpt., State House, Augusta, [illegible] sewage on Passamaquoddy and Penobscot [illegible] an Reservation. **$293,000**. Financing [illegible] provided.

Mass., Leeds—City of North[illegible]ton, Wm. R. Barry, supt. Schools, 17[illegible] South St., Northampton, brick, concrete [illegible]. To exceed **$150,000**. Financing not [illegible]ded.

Nev., Winnemucca—Humbold[illegible] Court House, Winnemucca, high sch[illegible] **$300,000**.

★**N. Y., New York**—Dpt. P. [illegible] Municipal Bldg., Zone 7, 11th Pr[illegible]t Station House, P. O. 47, **$469,000**; 5th [illegible]t Station House, P.O. 48, **$308,400**.

★**Okla., Boley**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., negro veterans hospital, **$750,000**.

Okla., Helena—Bd. Affairs, Capitol, Oklahoma City, addnl. bldg. at White Boys Training School. **$180,000**. Financing not provided.

Tex., Raymondville—Willacy Co. School Dist., c/o V. H. Tumlinson, Raymondville, 3 story, concrete, brick, etc., high school, concrete fdn. **$225,000**. Financing not provided.

★**Wash., Everett**—State Dpt. Finance, Social Security Bldg., Olympia, bldgs. at Everett Junior College. **$562,000**. Financing not provided.

Wash., Longview—State Dpt. Finance, Olympia, bldgs. at Lower Columbia River Junior College, **$350,000**. Financing not provided.

Wash., Mount Vernon—State Dpt. Finances, Social Security Bldg., Olympia, bldgs. for Mount Vernon Junior College, **$330,000**. Financing not provided.

★**Wash., Olympia**—State Dpt. of Finance, Olympia, state office bldg. **$1,000,000**. Financing not provided.

★**Wash., Pullman**—Washington State College, Pullman, light metals school bldgs, **$1,250,000**. Financing not provided.

Wash., Seattle—Federal Reserve Bank of San Francisco, Seattle Branch, National Bank of Commerce Bldg., 2 and Spring Sts., Zone 1, bank bldg. at 2 Ave. and Spring St. Over **$150,000**. Site purchased. Financing available.

★**Wash., Seattle**—University of Washington, E. 42 St. and 15 Ave. N.E., Zone 5, medical-dental school. **$3,750,000**. Financing provided. CD 1/17—ENR 2/8.

Wash., Woodland—School Bd., Woodland, $70,500 building fund election Mar. 3, school, **$300,000**. C. D. 2/13—ENR 3/8.

Wis., Sturgeon Bay—Door Co., H. Bassford, clk., agriculture research bldg. **$150,000**. Financing not provided.

B. C., Victoria—Municipality, art centre project, **$250,000**.

Man., St. Boniface—Municipality, Mayor G. MacLean, St. Boniface, community centre, **$150,000**.

Ont., Galt—Galt Pub. Utilities Co., 62 Dickson St., J. E. Temple, mgr., hydro-electric plant. **$100,000**.

Ont., Windsor—General Hospital Bd., City Hall, nurses home and training school, **$150,000**.

Ont., Windsor—Municipality, city hall. **$300,000**.

PLANS UNDER WAY

Calif., Burbank—City H. I. Stites, mgr., City Hall, plans by D. A. Elliott, 306 W. 3 St., Los Angeles, Public Service Dpt. Bldg. **$300,000**. CD 1/5—ENR 1/25.

★**Calif., Camarillo**—State, c/o State Dpt. Architecture, P. Wks. Bldg., Sacramento, plans by A. Boyd, state archt., P. Wks. Bldg., Sacramento, receiving, treatment and hospital group and administration units, **$2,120,000**; steam boiler, **$30,000**; domestic water sys. extens., **$20,000**; sewer plant addns. **$79,000**; backwash water softener disposal sys., **$40,000**; bakery and extension commissary, **$122,000**; cold storage unit addns., **$22,000**; Attendants' Quarters, Unit 4, **$115,000**; water softener **$22,000**; garages for Attendants' Quarters, **$35,000**; Attendants' Quarters 5, **$115,000**; Attendants' Quarters 6, **$115,000**; garages for Attendants' Quarters 6, **$16,000**; assembly hall for patients, **$150,000**; realign road from hospital group to employees quarters, **$33,200**; juvenile unit, **$223,500**, all at Camarillo State Hospital. CD 10/11/43—ENR 10/14/43.

★**Calif., Merced**—Merced Co., Court House, Merced, plans by C. E. Butner, 7 Witham St., Salinas, county agricultural and farm bureau bldgs., **$65,000**; rein.-con., steel county jail, **$180,000**; rein.-con. county hospital addn., **$350,000**.

★**Calif., Yountville**—State, Pub. Works Bldg., Sacramento, plans by A. Boyd, state archt., Pub. Works Bldg., Sacramento, 2 hospital wings, **$495,000**; convalescent barracks, **$280,000**; domiciliary barracks, **$260,000**; administration bldg., **$125,000**; women employees' quarters, **$150,000**; 5 cottages for doctors, **$50,000**; laundry and dry cleaning unit, **$140,000**; hog ranch addn., **$17,500**; commandant's quarters, **$20,000**; directors quarters and guest house, **$20,000**; grounds lighting sys., **$21,000**; electrical distr. sys., 1st unit, **$50,000**, all at Veterans' Home of California. CD 10/11/43—ENR 10/14/43.

The Tougher the Duck The Tougher the Tarp

When you want tarpaulins that will stand up under rough handling, yet give your jobs the maximum in weather protection, ask for MT. VERNON Extra duck. Made from top grades of cotton and woven to a high degree of uniformity, they have wear-resisting, weather-shedding qualities that have kept them the choice of the country's leading contractors for more than half a century.

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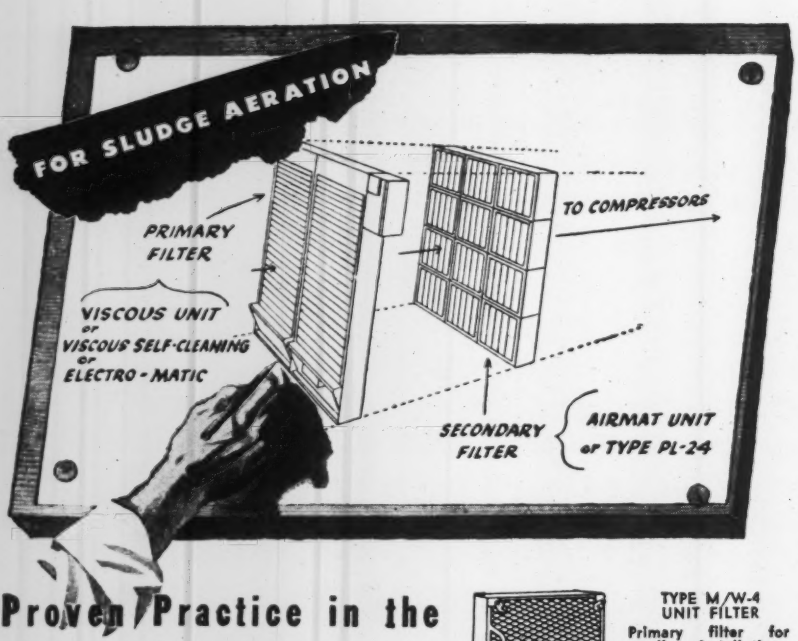

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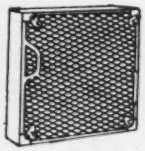
In the widely accepted activated sludge process for sewage treatment, clean air is a first requisite. The ceramic diffuser plates used in this process to secure thorough aeration quickly fill up if the air applied through them is only partially cleaned. That is why the economy of doubly filtered air has been so fully demonstrated. It reduces upkeep costs, and increases capacity. The AAF double air filtration method combining the use of two types of AAF filters in series is now proven practice. May we send you complete data. There is no obligation.

AMERICAN AAF AIR FILTERS



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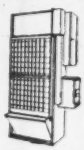
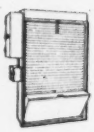
Primary filter for smaller installations. May be assembled in batteries for any dust concentration. High in efficiency; large dust holding capacity.

ELECTRO-MATIC FILTER

Offers highest cleaning efficiency, collecting dust by electrical precipitation. Automatic; self cleaning. Used as primary filter.





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Used as primary filter. Completely automatic; self cleaning; eliminating need of attention, assuring dependable performance at all times.

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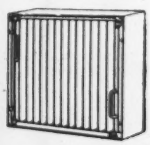

AMERICAN AIR FILTER COMPANY INC.

INCORPORATED

101 Central Avenue, Louisville 8, Ky.—In Canada, Darling Bros., Ltd., Montreal, P. Q.

POSTWAR PROJECTS (Cont'd.)

★**Conn., Cheshire**—State ... School Dist. 2, Cheshire, ... plans by D. Orr, 96 Grove St., New Ha... brick, ... high school, West Main ... $500,000. Financing not provided. CD 10/25—ENR 11/16.

Conn., Stamford—Town ... Selectmen, Town Hall, plans 60% comp... by F. ... Mayers, 2 W. 47 St., New ... N. Y. ... story, bsmnt., brick, steel ... Glenbrook section, $150,000. CD 1/17—ENR 2/3.

Conn., Westport—Town, ... Schools, ... W. State St., plans complet... by Tooker ... Marsh, 101 Park Ave., New York, N. Y. ... 2 wing addn. to Staples High School, Riverside Ave., incl. auditorium, ... gymnasium, cafeteria, Riverside Ave., ... $300,000. Financing not provided. CD 10/12—ENR 11/2.

★**Md., Catonsville**—Spring ... State Hospital, Catonsville, plans ... completed by Henry Powell Hopkins, 10 E. Mulberry St., Baltimore, admitting bldg., dairy barn, industrial shop, administration bldg., ... cottages, $844,000. J. Posey, 10 E. Pleasant St., Baltimore, mechanical engr. ... Rennsalaer P. Saxe, 100 W. Monument St., Baltimore, structural engr. CD 12/6—ENR 12/28.

Md., Owings Mills—Rosewood State Training School, Owings Mills, plans 40% completed by Henry Powell Hopkins, 10 E. Mulberry St., Baltimore, addns., 3 story bsmnt. bldgs. $250,000. Eiser & Akers, 910 N. Charles St., Baltimore, mechanical engrs. Van Renssalaer P. Saxe, 100 W. Monument St., Baltimore, structural engr. CD 5/24—ENR 6/1.

Mass., Chatham—Town, Bd. Selectmen, Town Hall, preliminary sketches by Edward Sears Read & Assoc., 172 State St., Boston, fish packing house and pier, foot of Harding Ave. To exceed $50,000. Financing not provided.

Mass., Gardner—Commonwealth of Massachusetts, Dpt. Mental Health, 100 Nashua St., Boston, plans nearing completion by Jas. A. Britton, 20 Federal St., Greenfield, 3 story, bsmnt., 40 x 380 ft., and 3 story brick, concrete, stone general hospital, $450,000. Financing not provided. L. G. Vale, 120 Tremont St., Boston, electrical engr. CD 1/24/44—ENR 2/10/44.

★**Mo., Clayton (St. Louis P. O.)**—St. Louis Co., Clayton, plans by Jamieson & Spearl, Arcade Bldg., St. Louis, ... courthouse and war memorial. $3,900,000. CD 10/16—ENR 11/2.

N. H., Brentwood—Rockingham Co., Brentwood, plans 70% completed by H. Rundlett, Rye, power plant, incl. 3 booster pumps, etc., installing watermains, $150,000. Financing not provided.

★**N. Y., Brooklyn**—New York City Housing Auth., 122 E. 42 St., New York, Zone 17, plans 70% completed by E. J. Kahn, 2 Park Ave., New York, Zone 16, R. Candela, 110 E. 42 St., New York, Zone 17, and W. T. McCarthy, 310 Ashland Pl., Brooklyn, Zone 17, Gowanus Houses, 1245 apartments, on site bounded by Wyckoff, Douglas, Hoyt and Bond Sts. $6,638,000. CD 1/10—ENR 1/25.

★**N. Y., Brooklyn**—New York City Housing Auth., 122 E. 42 St., New York, Zone 17, plans 50% completed by Voorhees, Walker, Foley & Smith, 101 Park Ave., New York, Zone 17, F. P. Platt & Bro., 221 W. 57 St., New York, Zone 19, and A. Goldberg, 164 Montague St., Brooklyn, Zone 2, combined Marcy Houses, 1,717 apartments on site bounded by Flushing, Marcy, Nostrand and Myrtle Aves. $11,186,000. Financing available. CD 1/10—ENR 1/25.

N. Y., New York—Dpt. Parks (Museums & Institutions), Arsenal Bldg., Central Park, 64 St. and 5 Ave., Zone 21, plans completed electric wiring sys., N. Y. Public Library, Central Bldg. Financing not provided. E. A. Sears, 13 E. 37 St., Zone 16, consult. engr. CD 2/23/43—ENR 3/30/43.

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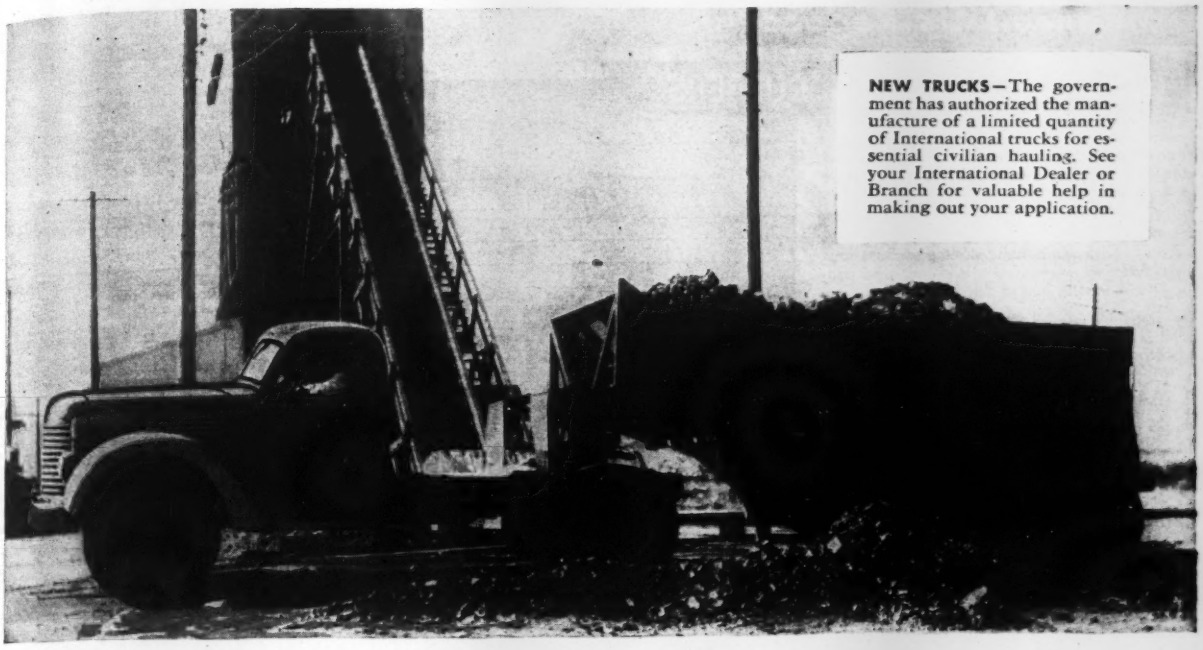

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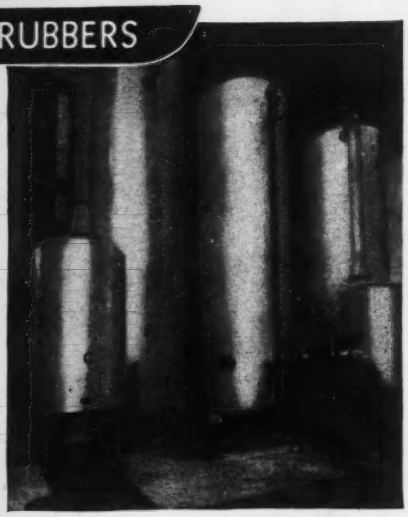
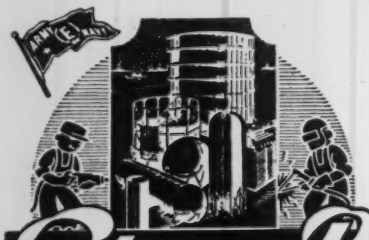


Photo above shows a group of Stacey Brothers primary and secondary condensers and scrubbers installed in a gas plant.



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POSTWAR PROJECTS (Cont.)

★**N. Y., New York**—New York City Housing Auth., 122 E. 42 St., [illegible] 17, plans 70% completed by O'Connor & Kilkeany, 342 E. 37 St., Zone 16, A. Emburg, 11, 250 E. 61 St., Zone 21, M. W. Del[illegible]don, 2473 Bainbridge Ave., Zone 58, Morris Houses, 1,791 apartments, on site bounded by Morris and 3 Aves., E. 139, E. 14[illegible]d E. 146 Sts. **$10,849,000.** CD 1/22—ENR 2/3.

O., Toledo—Comrs. Lucas Co., Court House, plans 50% completed, maintenance storage bldg., **$65,000**; brick steel maintenance storage bldg., **$60,000.** B. G. K[illegible]ng, County House, co engr.

Okla., Boley—Bd. Affairs, Capitol, Oklahoma City, plans 10% completed, bldg. at Negro Boys Training School. $150,000. Financing not provided.

Okla., Enid—Bd. Affairs, Capitol, Oklahoma City, plans 10% completed ward bldg. at Northern Oklahoma Insane Hospital, **$172,000.** Financing not provided.

Okla., Supply—Bd. Affairs, Capitol, Oklahoma City, plans 10% completed ward bldg. at Western Oklahoma Insane Hospital, **$167,000.** Financing not provided.

Okla., Taft—Bd. Affairs, Capitol, Oklahoma City, plans 10% completed addn. wing to the Training School for Negro Girls, **$150,000**; power plant and heating plant at the Negro Deaf and Blind Institute, $40,000. Financing not provided.

Okla., Vinita—Bd. Affairs, Capitol, Oklahoma City, plans 10% completed addn. wing at State Insane Hospital. $150,000. Financing not provided.

★**Ore., Salem**—School Bd., Salem, plans by Freeman & Hayslip, Postal Bldg., Portland, school addns. **$500,000.**

R. I., Providence—State, dir. Social Welfare, State House, plans by Jackson, Robertson & Adams, 1216 Turks Head Bldg., concrete, brick, stone clinical and administration bldg., at State Home School. Approx. **$150,000.**

Tex., Andrews—Bd. Educ., Andrews, plans 5% completed by Haynes & Strange, Myrick Bldg., Lubbock, 2 story, 180 x 1315 ft. brick, steel, hollow tile, concrete high school, **$300,000.** Financing not provided.

Tex., Eagle Pass—City of Eagle Pass and Maverick Co., Eagle Pass, plans 75% completed by Consolidated Architects & Engineers, 1010 Fort Worth National Bank Bldg., Fort Worth, hospital. **$150,000.** Financing available.

★**Tex., Galena Park (br. Houston)**—Galena Park Ind. School Dist., Galena Park, plans 50% completed by Hedrick & Lindsley, 811 Southern Standard Bldg., Houston, 2 story 258x425 ft., rein.-con., steel frame, etc. high school. **$600,000.** Financing available. CD 12/13—ENR 12/28.

Vt., Brattleboro—Town, H. Z. Persons, chn. School Bd., plans by Howe & Prout, 1016 Turks Head Bldg., Providence, R. I., high school, Western Ave. Over $150,000. Financing not provided. CD 3/24—ENR 4/5.

Wash., Issaquah—School Dist. 411, Issaquah, plans by W. Mallis, Lyon Bldg., 3 and James Sts., Seattle, Zone 4, 1 story basmt., 86x112 ft., and 105x128 ft. school and shop, both frame, **$150,000.** $90,000 bond election Mar. 3 for same.

Wis., Wisconsin Rapids—City, 441 W. Grand Ave., plans 10% completed by Childs & Smith, 430 N. Michigan Ave., Chicago, Ill., 2 story, 60x486 ft., steel frame, brick school with 2 wings, plain concrete fdn. **$350,000.** CD 2/24/44—ENR 3/9/44.

★**N. S., Truro**—Provincial Govt., Halifax, c/o Ministry of Educ., plans by Dpt. P. Wks., Halifax, normal and agricultural colleges. **$1,500,000.**

Ont., Ottawa—Dominion Govt., Ottawa, plans by Dpt. P. Wks., Ottawa, bldg. for Dpt. External Affairs, **$400,000.**

★**Ont., Ottawa**—Dominion Govt., Ottawa, plans by Dpt. P. Wks., Hunter Bldg., departmental block for Dpt. Veteran Affairs. **$1,000,000.**

Ont., Toronto—City of Toronto Pub. Welfare Dpt., 149 College St., Comr. A. W. Lever, plans by K. S. Gillies, Dpt. of Bldgs., City Hall, children's detention home, about **$300,000.**

READY FOR BIDS

Tex., Odessa—Bd. Educ., Odessa, plans completed by Haynes & Strange, Myrick Bldg., Lubbock, brick, concrete, natural stone high school. **$475,000.** Funds available. CD 2/8—ENR 3/8.

COMMERCIAL BUILDINGS

PROPOSED WORK

Conn., Hartford—M. J. Neiditz & Co., Inc., 18 Asylum St., brick apartment, store bldg. **$150,000.** Financing not provided.

Mass., Danvers—St. John's Preparatory School, c/o Rev. Brother Aloysius, Danvers, war memorial bldg., incl. gymnasium. To exceed **$150,000.** Financing not provided.

★**Mo., St. Louis**—Louis and Morris Steinbaum, Steinbaum Bros. Realty Co., Lindell and Kingshighway Blvds., Zone 8, purchased 237 ft. site and plans constructing hotel or apartment. Over **$1,000,000.**

Pa., Allentown—Muhlenberg College, P. P. Hagan, chn. United Appeal, c/o College, Allentown, bldgs. and addns. $200,000. Financing provided.

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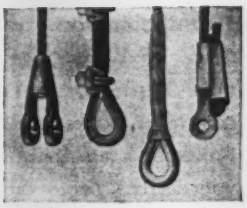

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POSTWAR PROJECTS (Cont'd.)

R. I., Greenville—Greenville Land Co., F. O. Bartlett, 1 Waterman Ave., Providence, small homes development, Nicholas Windsor Acreage, **$150,000.** Financing not provided.

R. I., Providence—Rhode Island Historic Society, 52 Power St., brick, stone addn., incl. auditorium, art gallery, **$200,000.** Financing not provided.

R. I., Woonsocket — Congregation B'Nai Israel, A. J. Darman, 565 North Main St., brick, concrete, stone synagogue. To exceed **$150,000.**

Tex., Dallas—Franklin Stores Corp., 1610 Elm St., 5 story, bsmnt. mercantile bldg. **$200,000.**

Tex., Dallas—St. Pauls Hospital, 3121 Bryan St., remodeling, modernizing hospital bldgs. **$225,000** or more. Financing not provided.

Tex., Fort Worth—Colonial Country Club, West End Park Hill Dr., country club imprvs., club house, locker rooms, modernization, air-conditioning, **$200,000.** Financing not provided.

Tex., Houston—Sears, Roebuck & Co., W. Arthington and S. Homan Sts., Chicago, Ill., commercial bldg., etc. Over **$150,000.** Site purchased.

Tex., Lufkin—Memorial Hospital Com., W. C. Trout, Lufkin, purchased 6 acre tract for hospital, **$150,000.** Partially financed.

Tex., Mission—First Baptist Church Congregation, c/o T. Lott, Mission, church **$150,000.** Purchased 3 lots for site. Financing not provided.

Ont., Windsor—Metropolitan Stores, 136 Dundas St., London, store, Oullette Ave. between Park and Wyandotte Sts. **$175,000.**

Ont., Windsor—A. Rose, c/o Rose Furniture Co., 20 Chatham St. E., furniture store. **$175,000.**

★**Ont., Woodstock**—Bd. of Trade, E. G. McKenzie, mayor and pres., several houses. About **$500,000.**

Ont., Woodstock—Bd. of Trade, E. G. McKenzie, mayor and chn., apartment. **$150,000.**

Que., Montreal — Montreal Convalescent Hospital Bd., S. P. Tansey, supt., 3001 Kent Ave., institution for care for the aged and chronically ill and especially tuberculosis cases. **$150,000.**

PLANS UNDER WAY

Conn., Ansonia—First Methodist Church, D. K. Sloatman, pastor, 43 Cottage St., plans by Thomas & Wagoner, 1701 Walnut St., Phila., Pa., rebuilding stone church. **$165,000.** Financing not available.

Conn., Hartford—Julius Hartt Musical Fdn., 187 Lr[illegible], A. C. Fuller, treas., plans by C. Nitzsche, Yale University, auditorium addn., imprvs., Broad St. **$250,000.** Financing not provided.

Mass., Leominster — Leominster Hospital Assn., B. W. Doyle, vice pres. Bd. Trustees, plans by Kendall Taylor & Co., brick, steel hospital addn. **$150,000.** Financing not available. CD 1/5—ENR 1/25.

Mass., South Byfield—Governor Dummer Academy, South Byfield, sketches by William, Hopkins & Greeley, 126 Newbury St., Boston, concrete, brick, stone gymnasium. Approx. **$150,000.**

★**N. H., Concord**—Concord Hospital, Concord, plans by Coolidge, Shepley, Bulfinch & Abbott, 1 Court St., Boston, Mass., concrete, brick, stone hospital and health center. **$1,000,000.** Financing not provided.

★**Pa., Chester**—Chester Hospital, S. Lloyd Irving, pres., 21 and Chestnut Sts., preliminary sketches completed by Zantzinger & Borie, 1531 Locust St., Phila., hospital. **$500,000.** Financing not provided.

Pa., Phila.—St. John's Lutheran Church, Rev. W. E. Brandt, pastor, 1515 Ogden St., plans by T. Normail Mansell, 262 S. 17 St., church, parsonage and educational bldg. **$150,000.** Financing not provided.

R. I., Providence—Osteopathic Hospital of Rhole Island, 1763 Broad St., plans by Monahan & Meikle, 255 Main St., Pawtucket, brick, steel maternity hospital, Norwood Ave. **$150,000.** Financing not provided. CD 6/15—ENR 7/13.

READY FOR BIDS

★**Ariz., Phoenix**—Hotel Adams, J. A. Rockwell, pres., Central Ave. and Adams St., plans completed by Lescher & Mahoney, Title & Trust Bldg., 5 story addn. to Adams Hotel, **$750,000-$800,000.** Holmes & Narver, 639 S. Spring St., Los Angeles, Calif., consult. engrs.

Mich., Detroit—Lane Bryant Stores, 1452 Farmer St., plans completed by Charles N. Agree, 1140 Book Tower, altering and additions, brick, steel store addns., alterations. **$250,000.** Financing available.

★**Tex., Houston**—Memorial Hospital, 602 Lamar St., plans completed by K. Franzheim, 2306 Crawford St., 5 story dormitory and school bldg. of nursing, **$500,000;** main hospital bldg. enlargement, **$400,000;** expan., imprv. "V. LeTulle Children's Unit", **$200,000;** laboratory and therapy bldg., **$150,000;** power plant unit, etc. **$75,000.** Financing provided. CD 8/24—ENR 9/7.

★**Tex., Houston**—Methodist Hospital, 1020 San Jacinto St., plans completed addnl. hospital bldgs., imprvs. **$1,000,000.** Financing available.

ADVANCED TO ACTIVE STATUS

Tex., Odessa—G. Elliott, [illegible] cancelled, 3 story, 37x150 ft. [illegible] brick, steel, rein.-con. hotel and [illegible] bldg. **$150,000** or more. Work now [illegible] reduced. CD 11/15—ENR 11[illegible]

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Oakland—LUMBER YARD—[illegible] Lumber Co., 22 Ave. and E[illegible] St., yard planing mill, incl. office, warehouse, sash and door shop and planing mill. **$200,000.**

Calif., Santa Rosa—PLANT—Coca-Cola Bottling Co., 1260 Mendocino Ave., 25x[illegible] ft. bottling plant.

Calif., Tracy—PLANT—H. J. Heinz Co., 2900 San Pablo Ave., Berkeley, food plant, on 73 acre site.

Conn., Stamford—PLANT—Stamford Electric Products Co., L. Jacobson, pres., impr., expanding plant on Southfield and Spring-side Aves. Over **$40,000.** Property acquired. Financing not provided.

Ga., Nashville—PLANT—Berrien Investment Co., J. B. Harvey, pres., Nashville, food plant, **$50,000.**

Mass., Fitchburg—PLANT—United Cooperative Farmers, Inc., 315 Broad St., poultry dressing plant, Broad St. **$50,000.** Financing not provided.

N. J., Hoboken — STORAGE — Fisher's Paper Mill Supplies, Inc., 601 Madison Ave., 2 story, brick storage bldg. **$40,000.**

Tex., Houston — PLANT — Peden Iron & Steel Co., 700 N. San Jacinto St., plant expansion. Over **$100,000.** Site purchased. Financing available.

★**Tex., Houston**—PLANT BLDG.—Ford Motor Co., Shell Bldg., Houston and Dearborn, Mich., purchased 8-acre tract and plans 1 story, rein.-con., brick, parts bldg. **$750,000.** Funds available.

Tex., Houston—WAREHOUSE, etc.—Oilfield Salvage Co., Inc., 2019 Brooks St., purchased 15 acre site for warehouse and office plant expan., over **$150,000;** purchased 21½ acre site for business and industrial bldgs., over **$150,000.** Financing available.

Tex., Houston—PLANT—Standco Belt Co., 2701 Clinton Dr., reconstructing bolt mfg. plant, **$100,000** or more. Financing not provided.

Tex., Levelland—PLANT—Consumers Co-Operative Refinery Assn., Levelland, improv. topping, blending and refinery plant. Over **$100,000.** Financing available.

Tex., San Antonio—PLANT—Dr. Pepper Bottling Co., 816 Dallas St., 2 story, [illegible] brick or structural tile plant. **$125,000.** Site purchased. Financing available.

Alta., Edmonton — PLANT — Northwest Brewing Co., Ltd., Edmonton, plant addn. **$75,000.**

B. C., Sidney—PLANT, etc.—Goddard & Co., Sidney, plant and laboratory. **$100,000.**

B. C., Vancouver—PLANT—Canadian Vermobile Co., Ltd., 263 E. 7 St., plant addn., mfg. concrete mixers, etc. **$70,000.**

B. C., Vancouver — FACTORY — Electric Panel Mfg. Co., Ltd., 1250 Richard St., Toronto, Ont., factory. **$50,000.**

B. C., Vancouver—FACTORY—Hart Pottery Co., Ltd., St. Johns, factory. **$40,000.**

N. B., Campbellton—PLANT—J. & D. A. Harquail Co., Ltd., Campbellton, woodworking plant addn. **$40,000.**

Ont., Fort William—PLANT—Great Lakes Lumber & Shipping, Ltd., Fort William, plant mfg. veneers, plywoods and prefabricated lumber. **$75,000.**

Ont., Hamilton—FACTORY—Duro Aluminum Co., Park St. N., factory. About **$100,000.**

Ont., Kitchener — PLANT — Kitchener Packers, Ltd., Kitchener, modern sausage making plant, etc. **$50,000.**

Ont., London—PLANT—Chas. R. Wilson Co., Ltd., London, plant for extens. mfg. pharmaceutical preparations.

Ont., Massey — FACTORY — The Oakville Basket Co., Ltd., Oakville, factory. **$75,000.**

Ont., Oakville — PLANT — The Oakville Basket Co., Ltd., Oakville, veneer plant for making plywood. **$40,000.**

Ont., Orillia — ELECTRIC FURNACE — Fahralloy Co., Ltd., Orillia, addnl. electric furnace.

Ont., Paris — PLANT — Sanderson Harold Co., Ltd., Paris, wood and steel, kitchen furniture mfg. plant, etc. **$45,000.**

Ont., Peterboro—PLANT—Western Clock Co., Ltd., Peterborough, plant [illegible]. **$50,000.**

Ont., Toronto—FACTORY—British Drug Houses Canada, Ltd., Terminal Warehouse, 2 story, concrete, steel, brick factory. **$100,000.**

Ont., Toronto—MACHINE SHOP, etc.—Convoy Enterprises, Ltd., c/o C. G. French, K. C., 62 W. Richmond St., machine shop, woodworking shop, assembly plant. **$40,000.**

Ont., Toronto — PLANT — Copper Wire Products, Ltd., 2738 W. Dundas St., plant mfg. radio transformers, etc. **$40,000.**

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Supplied with a 2⅜" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

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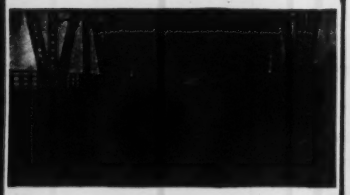
Only 15¼ lbs. per sq. ft.



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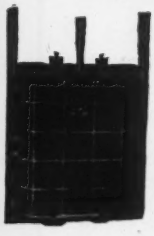

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POSTWAR PROJECTS (Cont'd)

Ont., Toronto — FACTORY — Jones Electric Chain Co. of Canada, Ltd., [illegible] John St., factory addn. housing 36 modern chain machines. **$40,000.**

Ont., Toronto—PLANT—W. J. Gage & Co. Ltd., 94 Spadina Ave., plant addn. **$50,000.**

Ont., Toronto—FACTORY—Gerber Bros. Ltd., 205 W. Richmond St., factory. **$50,000.**

Ont., Toronto—PLANT—Radio Components, Ltd., 560 W. King St., plant addn. mfg. switches, etc. **$40,000.**

Ont., Vittoria—PLANT—Hood Knit, Ltd., Vittoria, textile plant addn. **$50,000.**

Ont., Walkerton — PLANT — Bogdon & Gross Furniture Co., Ltd., Walkerton, veneer plant, with new equip. **$50,000.**

Ont., Windsor — PLANT — James Vernor Co., Inc., Windsor, aerated water mfg. plant. **$50,000.**

Que., Montreal—PLANT—Canadian Converters Ltd., 1643 Delorimer Ave., altering plant. **$300,000.**

Que., Montreal—PLANT—National Licorice Co., Ltd., 4211 Romen St., plant addn. **$40,000.**

Que., Montreal—FACTORY—Plastic Novelties Mfg. Co., Inc., 2049 Harvard Ave., factory, **$40,000.**

Que., Montreal — FACTORY — Will & Baumer Candle Co., Ltd., 422 E. Notre Dame St., enlarging factory.

Que., St. Tite—PLANT—G. A. Boulet, Ltd., St. Tite, exten. shoe mfg. plant. **$50,000.**

PLANS UNDER WAY

Mass., Fall River—FACTORY—J. & J. Corrugated Box Corp., M. Joffe, pres., 192 Anawan St., plans nearing completion by S. T. Dubitsky, 771 Rock St., concrete, brick, steel mfg. bldg. at Ferry St. To exceed **$40,000.** CD 10/5—ENR 10/12, under Industrial.

N. J., Salem—WAREHOUSE—H. J. Heinz Co., 1062 Progress St., Pittsburgh, Pa., plans by Skidmore, Owings & Merrill, [illegible] 57 St., New York, N. Y., 1 story, brick, steel warehouse, **$75,000.**

N. C., Charlotte—PLANT—Biltmore Dairy Farms, L. W. Slye, mgr., plans by L. Bale, Wilder Bldg., enlarging ice cream room, processing and cheese making plant and modern laboratory. **$50,000.**

Okla., Oklahoma City—TERMINAL, etc.—C. Kramer, 1726 S. Agnew St., plans 70' completed truck warehouse terminal and storage, 1700 S. Bway. **$50,000.** Financing available.

Tex., Houston—WAREHOUSE, etc.—Henke & Pillot, Inc., 304 Milam St., plans underway warehouse and wholesale bldg., **$150,000.** Financing available.

Que., Mont Joli—GARAGE, etc.—E. Roslise, Mont Joli, plans by L. Mainguy, 105 Cote de la Montague St., Quebec City, 2 story, 75 x 90 ft., rein.-con., public garage and showrooms. About **$50,000.**

READY FOR BIDS

Pa., Phila.—MANUFACTURING—Bunting Glider Co., E. Goldberg, in charge, 18 St. and Allegheny Ave., plans completed by F. E. Hahn, 1511 W. Oxford St., mfg. bldg. addn. **$50,000.** Financing available.

Ready for Bids

Of $17,000,000,000 of proposed postwar construction at beginning of 1945 only $550,000,000 was reported "ready for bids", plans complete and financing available.

If you have projects "ready for bids", please send them in to be added to the total above to give a measure of the materials that will be needed to relax restrictions and go ahead with civilian work.

Send ready-for-bids projects news to Elsie Eaves, Manager, Business News Department, Engineering News-Record, 330 W. 42 St., New York 18, N. Y.

ADVANCED TO ACTIVE STATUS

★**N. Y., New York**—MILK PLANT, etc.—Dairymen's League Cooperative Assoc., 11 E. 42 St., Zone 17, project cancelled, milk plant, factory, garage, repair shop, 12 Ave. between W. 47 and 48 Sts. Work now going ahead. **$650,000.** J. Feld, 103 Park Ave., Zone 17, archt. CD 1/2—ENR 1/11

UNCLASSIFIED

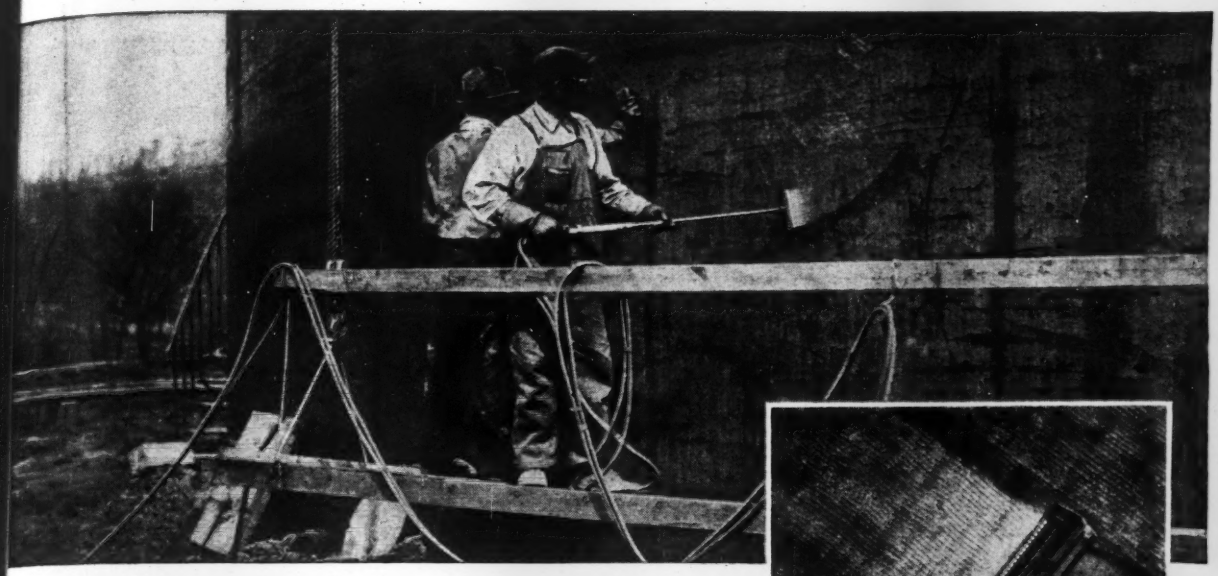
PROPOSED WORK

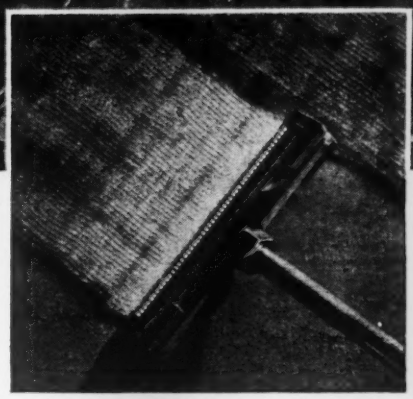
Calif., Fresno — RADIO STATION — McClatchy Broadcasting Co., 911 7 St., Sacramento, FM radio station. **$61,000.**

Calif., Monterey—LIGHTING, etc.—City, City Hall, lighting Del Monte and Fremont Sts. to city limits, **$43,800;** playground development, **$20,000;** community center, **$35,000;** development of El Estro park, incl. comfort station, **$33,000.**

Calif., Sacramento—RADIO STATION—McClatchy Broadcasting Co., 911 Seventh St., FM radio station. **$63,000.**

Calif., San Mateo—FIRE ALARM SYSTEM, etc.—City, City Hall, completing fire alarm sys., **$100,000;** Beresford Park development, **$72,300.**





FLAME-PRIMING

Saves Time! Saves Paint!

Oxy-acetylene flame-priming of steel, to remove loose scale, rust, and moisture before painting, requires less time than former methods. When the oxy-acetylene flame sweeps over the steel, the intense heat causes scale to expand and pop loose, and thoroughly dries the surface. Loosened foreign material can then be swept free with a wire brush. The surface is then clean, dry, and warm—ready for painting even in cold, humid, or fouled atmospheres. Because flame-primed surfaces can be painted satisfactorily under these conditions, it is possible to schedule painting at night and under weather conditions ordinarily considered unfavorable. Paint applied to warm surfaces dries quickly, thus decreasing its permeability to moisture.

Since the steel is still warm from the oxy-acetylene flame when the paint is applied, the fluidity of the paint increases so that a better bond is obtained, and less paint is needed than for application on a cold surface. In addition, heat prolongs the life of the paint by giving it a low-temperature bake on the dehydrated surface.

The flame-priming process is easy to learn and easy to use, and requires only a small amount of equipment. For more complete information about flame-priming, get in touch with your nearest Linde representative. If you prefer, write for the booklet, "Flame-Priming," Form 5322A.

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POSTWAR PROJECTS (Cont'd.)

Conn., Bridgeport—STADIUM—City, J. M. Levy, mayor, City Hall, Brownfield Park municipal stadium. Over $25,000. Financing not provided.

Ga., Moultrie—RADIO STATION—P. B. Pidcock, Jr., 606 Fifth Ave. S.E., FM radio station. **$35,000.**

Ill., Peoria—RADIO STATION—Commodore Broadcasting, Inc., 353 South Main St., Decatur, FM radio station. $69,050.

Ind., Indianapolis—RADIO STATION—Indiana Broadcasting Corp., 320 North Meridian St., FM radio station. $31,310.

Ia., Burlington—RADIO STATION—Burlington Broadcasting Co., National Bank Bldg., FM radio station. $40,100.

Kan., Wichita—RADIO STATION—Radio Station KFH Co., York Rite Temple Bldg., FM radio station. **$110,550.**

Minn., Albert Lea—ATHLETIC or RECREATION FIELD—Bd. Educ., City Hall, athletic or recreation field, $25,000.

Minn., Brainerd—ATHLETIC or RECREATION FIELD—Bd. Educ., Brainerd athletic or recreation field, $50,000.

Minn., Minneapolis—GOLF COURSE—City Bd. Park Comrs., C. E. Doell, secy., City Hall, imprv. Meadowbrook Golf Course, **$25,000.** To vote bond issue.

Minn., Nashwauk—ATHLETIC or RECREATION FIELD—Bd. Educ. (Nashwauk-Keewatin-Itasca), Nashwauk, athletic or recreation field, **$40,000.**

N. Y., Brooklyn—DOCKS, etc.—Dpt. Marine & Aviation, Pier A, North River, New York, Zone 5, reconstructing docks and slips at 39 St. **$400,000.**

O., Athens—RADIO STATION—Messenger Publishing Co., 43 W. Union St., Athens, FM radio station, **$26,500.**

Ore., Medford—SWIMMING POOL—City, City Hall, F. H. Rogers, supt., swimming pool. **$62,500.** Financing not provided.

Ore., Salem—OUTSIDE WALL—State Bd. Control, Salem, replacing outside wall at State Penitentiary. **$100,000.** Financing not provided.

Pa., Abington—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$45,000.** Financing not provided.

Pa., Allentown-Bethlehem—AIRPORT—City, grading, paving, lighting airport, **$390,000.** CAA will help finance.

Pa., Allentown—RADIO STATION—Lehigh Valley Broadcasting Co., 39-41 North Tenth St., FM radio station. **$104,300.**

Pa., Altoona—AIRPORT—City, grading, paving, lighting airport. **$1,400,000.** CAA will help finance.

Pa., Ambler—AIRPORT—City, grading, paving, lighting airport. **$263,000.** CAA will help finance.

Pa., Ambridge—AIRPORT—City, grading, lighting airport. **$87,000.** CAA will help finance.

Pa., Andreas—AIRPORT—City, grading, paving, lighting airport. **$263,000.** CAA will help finance.

Pa., Avalon—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport, **$49,000.** Financing not provided.

Pa., Bakerstown—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport, **$37,500.** Financing not provided.

Pa., Barnesboro—AIRPORT—City, grading, lighting airport. **$87,000.** CAA will help finance.

Pa., Beaver Falls—AIRPORT—City, grading, paving airport. **$473,000.** CAA will help finance.

Pa., Bedford—AIRPORT—City, grading, paving, lighting airport. **$393,000.** CAA will help finance.

Pa., Bellefonte—AIRPORT—City, grading, paving, lighting airport. **$333,000.** CAA will help finance.

Pa., Bentleyville—AIRPORT—City, grading, paving, lighting airport. **$413,000.** CAA will help finance.

Pa., Berlin—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Berwick—AIRPORT—City, grading, paving, lighting airport. **$343,000.** CAA will help finance.

Pa., Bigler—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$35,000.** Financing not provided.

Pa., Birdsboro—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$45,000.**

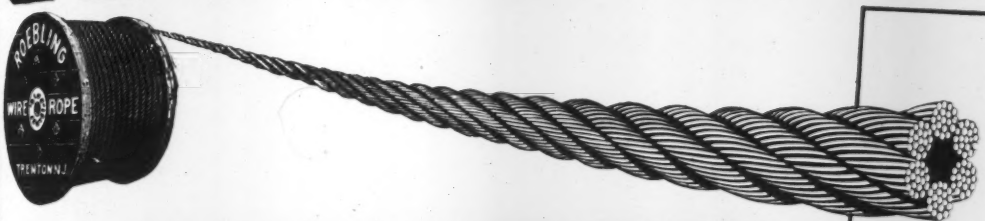
Pa., Black Moshannno—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 4 airport. **$50,000.** Financing not provided.

Pa., Blain—AIRPORT—City, grading, lighting airport. **$46,000.** CAA will help finance.

Pa., Blairsville—AIRPORT—City, grading, paving, lighting airport. **$333,000.** CAA will help finance.

Pa., Bloomsburg—AIRPORT—City, grading, paving, lighting airport. **$273,000.** CAA will help finance.

ROEBLING



RUGGED CONSTRUCTION?...

QUESTIONS AND ANSWERS

Q What is meant by the designations of 6x7, 6x19, 8x19, and 6x37 rope?

A Each of the above designate a particular group or classification of wire rope: the 6x7 rope contains 6 strands of 7 wires each, whereas the 6x19 rope contains 6 strands with from 16 to 25 wires per strand. The 8x19 rope contains 8 strands with from 16 to 25 wires per strand, while the 6x37 rope contains 6 strands having from 26 to 46 wires per strand.

Q How do the above groups or classifications of ropes compare as to abrasion resistance and flexibility?

A The 6x7, 6x19, 8x19 and 6x37 ropes are rated as listed with respect to abrasion resistance, the 6x7 having the greatest resistance to abrasion. The flexibility of these ropes follow in the same order with the 6x7 having the least flexibility.

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NO TIME to "Baby" your equipment when you've got to keep a heavy flow of construction materials moving at a fast clip. And whether it's shovel or hoist, crane or dragline — efficiency depends on wire rope that has the capacity to *deliver*... day in and day out. That's why, when the heat's on to meet construction schedules, you can have confidence in Roebling "Blue Center" Wire Rope ...and it's all-around, built-in *quality*.

Precision-engineered... to combine strength and flexibility with fatigue-and-abrasion resistance to best advantage for the job. Roebling "Blue Center" Wire Rope reduces maintenance problems, expensive stoppages... and operation costs.

And remember that Roebling, with a century's background of wire specialization, can help you choose the *right rope for your job.* Check with our nearest branch office, and get started on the way to increased output from your rope-rigged equipment. Our wire rope engineers are always at your service.

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POSTWAR PROJECTS (Cont'd.)

Pa., Blossburg—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Boswell—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Boyertown—AIRPORT—City, grading, lighting airport. **$35,000.** CAA will help finance.

Pa., Bradford—AIRPORT—City, grading, paving, lighting airport. **$235,000.** CAA will help finance.

Pa., Bridgeville—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Bristol—AIRPORT—City, grading, paving, lighting airport. **$403,000.** CAA will help finance.

Pa., Brookville—AIRPORT—City, grading, paving, lighting airport. **$235,000.** CAA will help finance.

Pa., Brownsville—AIRPORT—City, grading, paving, lighting airport. **$403,000.** CAA will help finance.

Pa., Bryn Mawr—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$37,500.** Financing not provided.

Pa., Burgettstown—AIRPORT—City, grading, paving airport. **$393,000.** CAA will help finance.

Pa., Butler — AIRPORT — State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 3,700-4,700 ft. runway, **$415,000.**

Pa., Canton—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Carbondale—AIRPORT—City, grading, paving, lighting airport. **$433,000.** CAA will help finance.

Pa., Carlisle—AIRPORT—City, grading, lighting airport. **$50,000.** CAA will help finance.

Pa., Casselman—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Chambersburg — AIRPORT — City, grading, paving, lighting airport. **$253,000.** CAA will help finance.

Pa., Cherry Springs—AIRPORT—City, grading airport. **$37,000.** CAA will help finance.

Pa., Chester — AIRPORT — City, grading, paving, lighting airport. **$293,000.** CAA will help finance.

Pa., Clarion—AIRPORT—City, grading, paving, lighting airport. **$333,000.** CAA will help finance.

Pa., Clairton—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$47,000.**

Pa., Clearfield—AIRPORT—City, grading, paving, lighting airport. **$313,000.** CAA will help finance.

Pa., Clifton Heights — AIRPORT — State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$41,000.** Financing not provided.

Pa., Coalport—AIRPORT—City, grading, lighting airport. **$97,000.** CAA will help finance.

Pa., Collegeville—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Columbia—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Confluence—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$48,000.** Financing not provided.

Pa., Connellsville—AIRPORT—City, grading, paving, lighting airport. **$350,000.** CAA will help finance.

Pa., Conway—AIRPORT—City, grading, lighting airport. **$35,000.** CAA will help finance.

Pa., Cory—AIRPORT—City, grading airport. **$73,000.** CAA will help finance.

Pa., Coudersport—AIRPORT—City, grading, lighting airport. **$68,000.** CAA will help finance.

Pa., Cresson—AIRPORT—City, grading, lighting airport. **$87,000.** CAA will help finance.

Pa., Danville—AIRPORT—City, grading, paving, lighting airport. **$313,000.** CAA will help finance.

Pa., Dormont—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 2,700-3,700 ft. runway. **$444,000.**

Pa., Douglassville—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Downingtown—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Doylestown—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Dravosburg—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Driftwood—AIRPORT—City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Du Bois—AIRPORT—City, grading, paving, lighting airport. **$433,000.** CAA will help finance.

Pa., Duncansville—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$26,000.**

Pa., Eagles Mere—AIRPORT—City, grading, lighting airport. **$80,000.** CAA will help finance.

Pa., Easton—AIRPORT—City, grading, paving, lighting airport. **$253,000.** CAA will help finance.

Pa., Ebensburg—AIRPORT—City, grading, paving, lighting airport. **$263,000.** CAA will help finance.

Pa., Edinboro—AIRPORT—City, grading, lighting airport. **$58,000.** CAA will help finance.

Pa., Ellwood City—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Emlenton—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Emmaus—AIRPORT—City, grading, lighting airport. **$78,000.** CAA will help finance.

Pa., Ephrata—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Erie—AIRPORTS—City, imprv. airport, **$40,000**; grading, lighting airport, **$33,000.** CAA will help finance.

Pa., Franklin—AIRPORT—City, grading, lighting airport. **$55,000.** CAA will help finance.

Pa., Galeton—AIRPORT—City, grading, lighting airport, **$61,000.** CAA will help finance.

Pa., Gap—AIRPORT—City, grading, lighting airport. **$66,000.** CAA will help finance.

Pa., Gettysburg—AIRPORT—City, grading, paving, lighting airport. **$263,000.** CAA will help finance.

Pa., Gordon—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$30,000.** Financing not provided.

Pa., Greensburg—AIRPORT—City, grading, paving, lighting airport. **$283,000.** CAA will help finance.

Pa., Greenville—AIRPORT—City, grading, lighting airport. **$47,000.** CAA will help finance.

Pa., Grove City—AIRPORT—City, grading, paving, lighting airport. **$343,000.** CAA will help finance.

Pa., Hanover—AIRPORT—City, grading, lighting airport. **$49,000.** CAA will help finance.

Pa., Hatboro—AIRPORT—City, grading, paving, lighting airport. **$303,000.** CAA will help finance.

Pa., Harrisburg—RADIO STATION—W.H.P., Inc., c/o A. Redmond, 216 Locust St., high frequency radio station, **$175,000.**

Pa., Hawley — AIRPORT — City, grading, lighting airport. **$62,000.** CAA will help finance.

Pa., Hershey—AIRPORT—City, grading, lighting airport. **$69,000.** CAA will help finance.

Pa., Honesdale—AIRPORT—City, grading, paving, lighting airport. **$303,000.** CAA will help finance.

Pa., Honey Brook—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed airport addns. **$25,000.** Financing not provided.

Pa., Houtzdale—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Hyndman—AIRPORT—City, grading, lighting airport. **$70,000.** CAA will help finance.

Pa., Indiana—AIRPORT—City, grading, paving, lighting airport. **$348,000.** CAA will help finance.

Pa., Jeannette—AIRPORT—City, grading, lighting airport. **$87,000.** CAA will help finance.

Pa., Jersey Shore—AIRPORT—City, grading, lighting airport. **$71,000.** CAA will help finance.

Pa., Johnsonburg—AIRPORT—City, grading, lighting airport. **$65,000.** CAA will help finance.

Pa., Johnstown—AIRPORT—City, imprv. airport. **$30,000.** CAA will help finance.

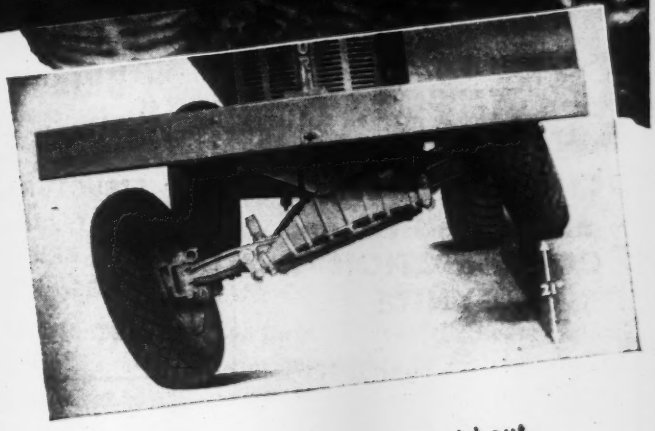
Pa., Johnsville—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed, Class 1 airport addns. **$25,000**; Class 3 airport addns. **$25,000.** Financing not provided.

Pa., Kane — AIRPORT — City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Kennett Square — AIRPORT — City, grading, lighting airport. **$52,000.** CAA will help finance.

HIGH STEPPING FRONT AXLE TAKES THE TWIST OUT OF HAUL ROAD TRAVEL

Strip mine haul roads aren't boulevards. But twisting strains of ruts and furrows can't get at Dumptor frames, can't make steering tough for Dumptor drivers. Oscillating action of the steering axle, pivot anchored to the frame at one point only, rides along with the strain. Twist is absorbed before it can distort the frame. Heavy leaf springs cushion vertical shocks. Nickel steel I beam is the heavy-duty backbone of the assembly.



Dumptor can climb 21" furrow without frame distortion. Free oscillating front axle, spring mounted, absorbs twisting strains.

KOEHRING COMPANY *Milwaukee 10, Wis.* . . . .

ARMY E NAVY

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Photograph courtesy of Diamond T Motor Car Co., Chicago, Ill.

The above typical service application shows a Wisconsin single cylinder air-cooled engine *on the job*, in a gravel dredging and washing operation in Mendicino County, Cal.

Wisconsin single and 4-cylinder air-cooled engines, from 1 to 31 hp., are giving good accounts of themselves in a great variety of applications, on many types of contracting and industrial equipment where heavy-duty serviceability and freedom from cooling troubles and attention are important operating factors. Specify Wisconsin Power for *your* equipment.

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POSTWAR PROJECTS (Cont'd)

Pa., Kittanning—AIRPORT—City, grading, paving, lighting airport. $443,000. CAA will help finance.

Pa., Knoxville—AIRPORT—City, grading, lighting airport. $63,000. CAA will help finance.

Pa., Kutztown—AIRPORT—City, grading, lighting airport. $62,000. CAA will help finance.

Pa., Kylertown—AIRPORT—City, grading, paving, lighting airport. $250,000. CAA will help finance.

Pa., Lancaster—AIRPORT—City, grading, paving, lighting airport. $485,000. CAA will help finance.

Pa., Langhorne—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. $250.

Pa., Lansdale—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 3 airport, $226,250. Financing not provided.

Pa., Latrobe—AIRPORT—City, grading, paving, lighting airport. $178,000. CAA will help finance.

Pa., Lebanon—AIRPORT—City, grading, paving, lighting airport. $298,000. CAA will help finance.

Pa., Leechburg—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 3 airport. $25,000. Financing not provided.

Pa., Lehighton—AIRPORT—City, grading, paving, lighting airport. $275,000. CAA will help finance.

Pa., Lewisburg—AIRPORT—City, grading, paving, lighting airport. $303,000. CAA will help finance.

Pa., Lewiston—AIRPORT—City, grading, paving, lighting airport. $293,000. CAA will help finance.

Pa., Littlestown—AIRPORT—City, grading, lighting airport. $77,000. CAA will help finance.

Pa., Lock Haven—AIRPORT—City, grading, lighting airport. $37,000. CAA will help finance.

Pa., McConnellsburg — AIRPORT — City, grading, lighting airport. $77,000. CAA will help finance.

Pa., Mansfield—AIRPORT—City, grading, lighting airport. $77,000. CAA will help finance.

Pa., Marineville — AIRPORT — City, grading, lighting airport. $57,000. CAA will help finance.

Pa., Mars — AIRPORT — City, grading, lighting airport. $47,000. CAA will help finance.

Pa., Martinsburg—AIRPORT—City, grading, paving, lighting airport. $230,000. CAA will help finance.

Pa., Marysville—AIRPORT—City, grading, lighting airport. $57,000. CAA will help finance.

Pa., Masontown—AIRPORT—City, grading, lighting airport. $102,000. CAA will help finance.

Pa., Matamoras—AIRPORT—City, grading, paving, lighting airport. $261,000. CAA will help finance.

Pa., Meadville—AIRPORT—City, grading, paving, lighting airport. $258,000. CAA will help finance.

Pa., Media—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed, Class 1 airport, $36,000. Financing not provided.

Pa., Mercer — AIRPORT — City, grading, paving, lighting airport. $255,000. CAA will help finance.

Pa., Mercersburg—AIRPORT—City, grading, lighting airport. $77,000. CAA will help finance.

Pa., Meyerdale—AIRPORT—City, grading, paving, lighting airport. $403,000. CAA will help finance.

Pa., Middleburg—AIRPORT—City, grading, lighting airport. $87,000. CAA will help finance.

Pa., Midland—AIRPORT—City, grading, lighting airport. $67,000. CAA will help finance.

Pa., Mifflinburg—AIRPORT—City, grading, lighting airport. $65,000. CAA will help finance.

Pa., Mifflintown—AIRPORT—City, grading, lighting airport. $65,000. CAA will help finance.

Pa., Millersburg—AIRPORT—City, grading, lighting airport. $69,000. CAA will help finance.

Pa., Millheim—AIRPORT—City, grading, lighting airport. $69,000. CAA will help finance.

Pa., Milroy — AIRPORT — City, grading, lighting airport. $62,000. CAA will help finance.

Pa., Monessen—AIRPORT—City, grading, paving, lighting airport. $493,000. CAA will help finance.

Pa., Montgomeryville — AIRPORT — City, grading, paving, lighting airport. $278,000. CAA will help finance.

Pa., Montrose—AIRPORT—City, grading, lighting airport. $57,000. CAA will help finance.

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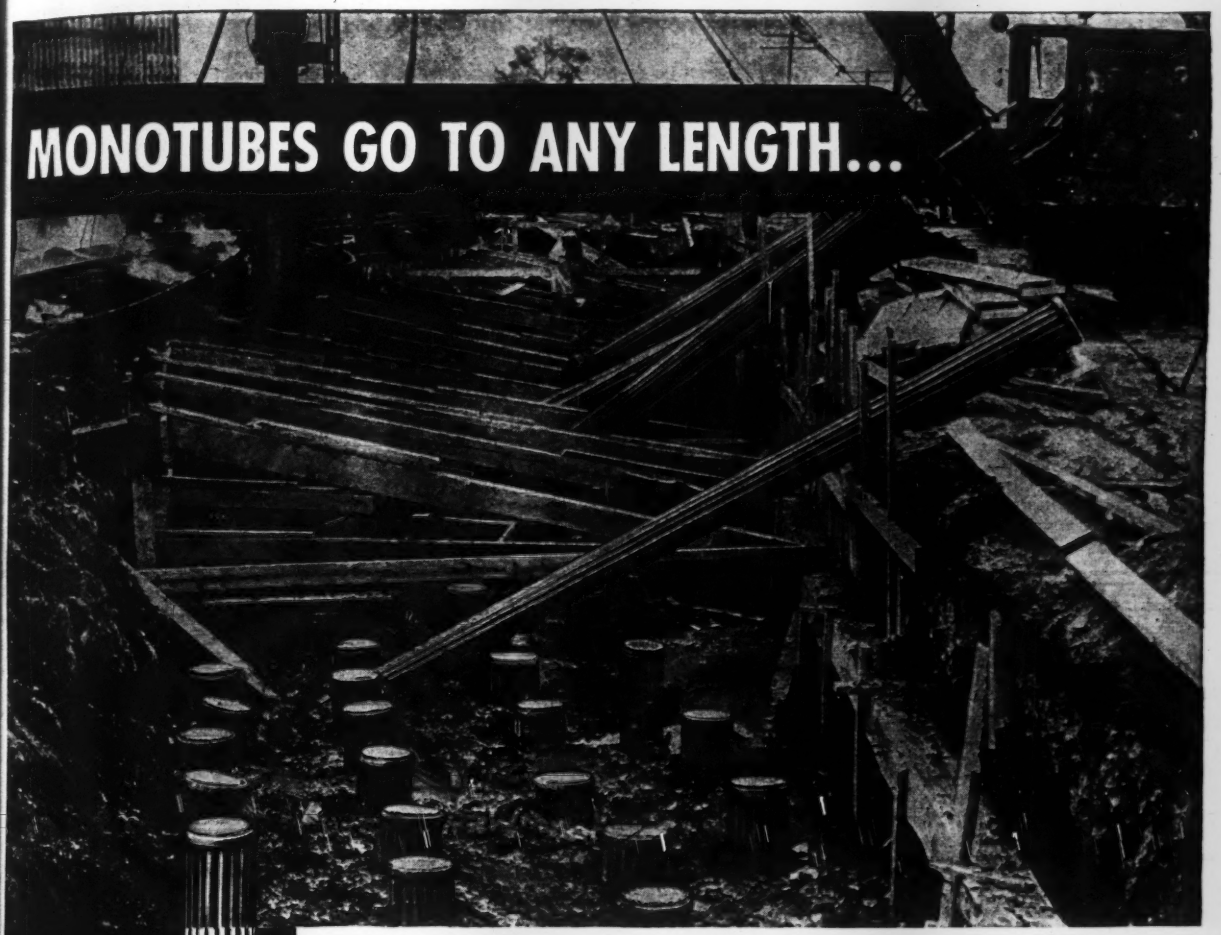

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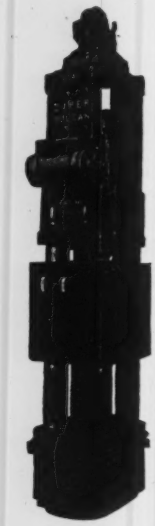

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POSTWAR PROJECTS (Cont'd.)

Pa., Moon Twp.—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 4,700-5,700 ft. runway, **$422,500.**

Pa., Mount Carmel — AIRPORT — City, grading, lighting airport. **$112,000.** CAA will help finance.

Pa., Mount Holly Springs—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Mount Jewett — AIRPORT — City, grading, lighting airport. **$46,000.** CAA will help finance.

Pa., Mount Pocono — AIRPORT — City, grading, paving, lighting airport. **$205,000.** CAA will help finance.

Pa., New Castle—AIRPORT—City, grading, paving, lighting airport. **$155,000.** CAA will help finance.

Pa., New Hanover — AIRPORT — State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., New Hope—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway, **$45,000.**

Pa., New Kingston — AIRPORT — City, grading, lighting airport. **$35,000.** CAA will help finance.

Pa., Newport—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Norristown — AIRPORT — City, grading, paving, lighting airport. **$283,000.** CAA will help finance.

Pa., North East—AIRPORT—City, grading, lighting airport. **$85,000.** CAA will help finance.

Pa., Oakmont—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$45,000.**

Pa., Oil City—AIRPORT—City, grading, paving, lighting airport. **$272,000.** CAA will help finance.

Pa., Orwigsburg—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$26,250.** Financing not provided.

Pa., Ottsville—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$28,500.**

Pa., Oxford—AIRPORT—City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Palmerton—AIRPORT—City, grading, lighting airport. **$81,000.** CAA will help finance.

Pa., Paoli—AIRPORT—State Aeronautics Com., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Pennsburg—AIRPORT—City, grading, lighting airport. **$63,000.** CAA will help finance.

Pa., Phoenixville—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Pine Grove—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Pitcairn—AIRPORT—City, grading, paving, lighting airport. **$283,000.** CAA will help finance.

Pa., Pleasant Mount—AIRPORT—City, grading, lighting airport. **$62,000.** CAA will help finance.

Pa., Pottstown—AIRPORT—City, grading, paving, lighting airport. **$303,000.** CAA will help finance.

Pa., Punxsutawney — AIRPORT — City, grading, paving, lighting airport. **$323,000.** CAA will help finance.

Pa., Quakertown—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Quarryville—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Ralston — AIRPORT — City, grading, lighting airport. **$62,000.** CAA will help finance.

Pa., Reading — AIRPORT — City, lighting, imprv. airport. **$75,000.** CAA will help finance.

Pa., Red Lion—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Renova—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Ridgway—AIRPORT—City, grading, lighting airport. **$58,000.** CAA will help finance.

Pa., Rimersburg—AIRPORT—City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Robertsdale—AIRPORT—City, grading, lighting airport. **$59,000.** CAA will help finance.

Pa., Sagamore—AIRPORT—City, grading, lighting airport. **$60,000.** CAA will help finance.

Pa., Saint Marys—AIRPORT—City, grading, lighting airport. **$71,000.** CAA will help finance.

Pa., Sali—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, preliminary plans completed Class 1 airport. **$25,000.** Financing not provided.

Pa., Saltsburg—AIRPORT—City, grading, lighting airport. **$87,000.** CAA will help finance.

Pa., Sayre — AIRPORT — City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Scottdale—AIRPORT—City, grading, lighting airport. **$87,000.** CAA will help finance.

Pa., Scranton—AIRPORTS—City, grading, lighting airport **$47,000**, grading, paving, lighting airport **$273,000**, grading, lighting airport **$82,000**, grading, lighting airport **$77,000.** CAA will help finance.

Pa., Selingsgrove—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Sewickley — AIRPORT — State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$52,500.**

Pa., Shamokin—AIRPORT—City, grading, paving, lighting airport. **$493,000.** CAA will help finance.

Pa., Sharon — AIRPORT — City, grading, paving, lighting airport. **$453,000.** CAA will help finance.

Pa., Sharpsburg—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$49,000.**

Pa., Sheffield—AIRPORT—City, grading, lighting airport. **$62,000.** CAA will help finance.

Pa., Shenandoah—AIRPORT—City, grading, paving, lighting airport. **$443,000.** CAA will help finance.

Pa., Shippensburg—AIRPORT—City, grading, lighting airport. **$59,000.** CAA will help finance.

Pa., Shoemakersville — AIRPORT — State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$45,000.**

Pa., State College—AIRPORT—City, grading, paving, lighting airport. **$403,000.** CAA will help finance.

Pa., Stroudsburg—AIRPORT—City, grading, paving, lighting airport. **$323,000.** CAA will help finance.

Pa., Susquehanna—AIRPORT—City, grading, lighting airport. **$59,000.** CAA will help finance.

Pa., Tamaqua—AIRPORT—City, grading, paving, lighting airport. **$343,000.** CAA will help finance.

Pa., Tarentum—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$30,000.**

Pa., Tionesta—AIRPORT—City, grading, lighting airport. **$72,000.** CAA will help finance.

Pa., Towanda—AIRPORT—City, grading, paving, lighting airport. **$153,000.** CAA will help finance.

Pa., Troy—AIRPORT—City, grading, lighting airport. **$77,000.** CAA will help finance.

Pa., Tunkhannock—AIRPORT—City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Tyrone—AIRPORT—City, grading, lighting airport. **$46,000.** CAA will help finance.

Pa., Union City—AIRPORT—City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Valley View—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Warren—AIRPORT—City, grading, paving, lighting airport. **$283,000.** CAA will help finance.

Pa., Washington—AIRPORT—City, grading, paving, lighting airport. **$453,000.** CAA will help finance.

Pa., Waynesboro—AIRPORT—City, grading, lighting airport. **$37,000.** CAA will help finance.

Pa., Waynesburg—AIRPORT—City, grading, paving, lighting airport. **$283,000.** CAA will help finance

Pa., Weatherly — AIRPORT — State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 1,800-2,700 ft. runway. **$48,000.**

Pa., Wellsboro—AIRPORT—City, grading, paving, lighting airport. **$483,000.** CAA will help finance.

Pa., West Chester — AIRPORT — City, grading, paving, lighting airport. **$103,000.** CAA will help finance.

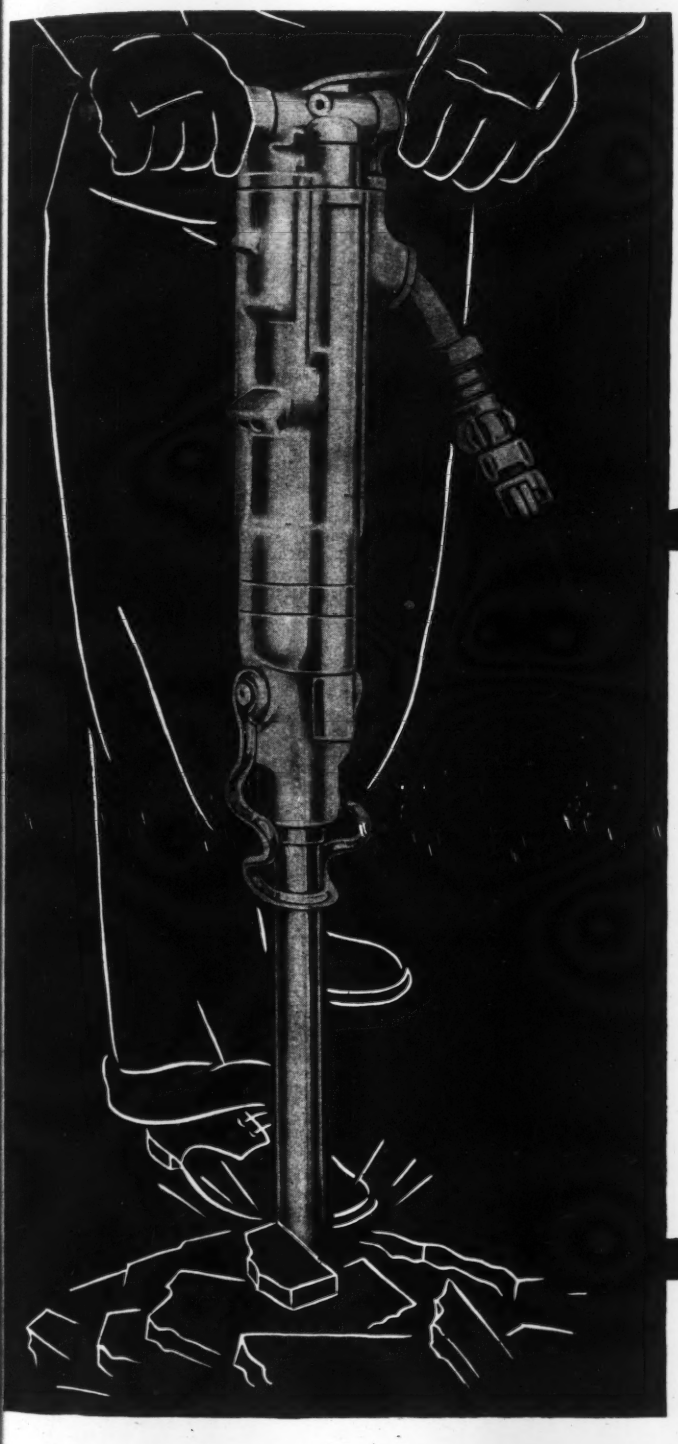
Pa., West Newton — AIRPORT — City, grading, lighting airport. **$57,000.** CAA will help finance.

Pa., Wilkinsburg—AIRPORT—State Aeronautics Comn., F. Chalfant, chn., Harrisburg, airport, 2,700-3,700 ft. runway. **$485,500.**

Pa., Williamsburg—AIRPORT—City, grading, lighting airport. **$67,000.** CAA will help finance.

Pa., Williamsport—AIRPORT—City, grading airport. **$80,000.** CAA will help finance.

Pa., Williamstown — AIRPORT — City, grading, lighting airport. **$62,000.** CAA will help finance.



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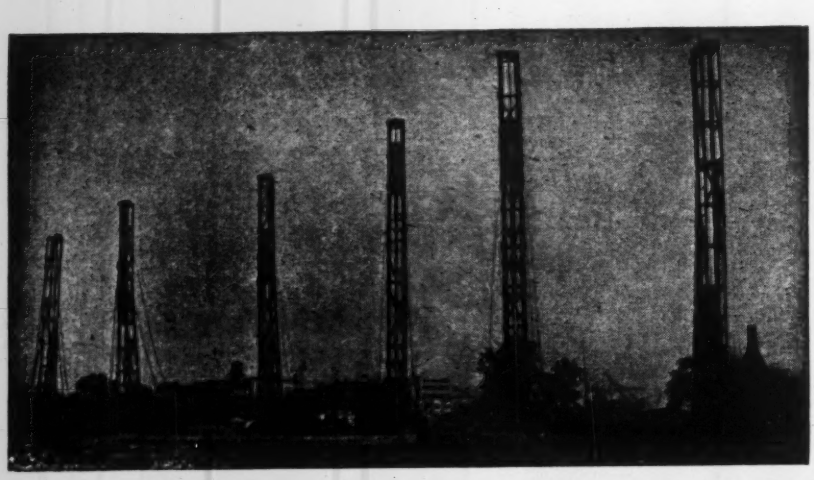

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POSTWAR PROJECTS (Cont'd)

Pa., Windber—AIRPORT—City, grading, lighting airport. $72,000. CAA will help finance.

Pa., Womelsdorf—AIRPORT—State Aeronautics Comn., F. Chalfant, ch., Harrisburg, airport, 1,800-2,700 ft. runways. $45,000.

Pa., Wyalusing—AIRPORT—City, grading, lighting airport. $67,000. CAA will help finance.

Pa., York—AIRPORT—City, grading, paving, lighting airport. $383,000. CAA will help finance.

R. I., Block Island — AIRPORT — City, grading airport. $192,000. CAA will help finance. CD 9/9/43—ENR 9/16/43.

R. I., Burrillville—AIRPORT—City, grading, paving, lighting airport. $473,000. CAA will help finance.

R. I., Charlestown—AIRPORT—City, grading, lighting airport $37,000, grading airport $154,000. CAA will help finance.

R. I., East Greenwich—AIRPORT—City, grading airport. $157,000. CAA will help finance.

R. I., Exeter—AIRPORT—City, grading airport. $177,000. CAA will help finance.

R. I., Greene—AIRPORT—City, grading, paving, lighting airport. $473,000. CAA will help finance.

R. I., Hopkinton—AIRPORT—City, grading airport. $206,000. CAA will help finance.

R. I., Jamestown—AIRPORT—City, grading airport. $157,000. CAA will help finance.

R. I., Narragansett — AIRPORT — City, grading, paving, lighting airport. $473,000. CAA will help finance.

R. I., Newport—AIRPORT—City, grading, lighting airport. $473,000. CAA will help finance. CD 9/9/43—ENR 9/16/43.

R. I., Providence Hills—AIRPORT—City, grading, paving, lighting airport. $379,000. CAA will help finance.

R. I., Scituate—AIRPORT—City, grading airport. $226,000. CAA will help finance.

R. I., Smithfield—AIRPORT—City, grading airport. $154,000. CAA will help finance.

R. I., Tiverton—AIRPORT—City, grading airport. $157,000. CAA will help finance.

R. I., Westerly—AIRPORT—City, grading, paving, lighting airport. $415,000. CAA will help finance.

S. C., Abbeville—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Allendale-Fairfax — AIRPORT — Cities, grading airport. $165,000. CAA will help finance.

S. C., Anderson—AIRPORT—City, grading, paving, lighting airport. $230,000. CAA will help finance.

S. C., Andrews—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Bamberg—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Batesburg—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Belton—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Bennettsville — AIRPORT — City, grading, paving airport. $426,000. CAA will help finance.

S. C., Bishopville—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Cheraw-Chesterfield — AIRPORT — Cities, grading, paving, lighting airport. $380,000. CAA will help finance.

S. C., Clemson—AIRPORT—City, grading, paving, lighting airport. $400,000. CAA will help finance.

S. C., Conway—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Dillon-Latta — AIRPORT — Cities, grading airport. $210,000. CAA will help finance.

S. C., Easley—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Eau Claire—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Edgefield-Johnston — AIRPORT — Cities, grading airport. $210,000. CAA will help finance.

S. C., Estill—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Gaffney—AIRPORT—City, grading, paving, lighting airport. $400,000. CAA will help finance.

S. C., Greenwood—AIRPORT—City, lighting airport. $33,000. CAA will help finance.

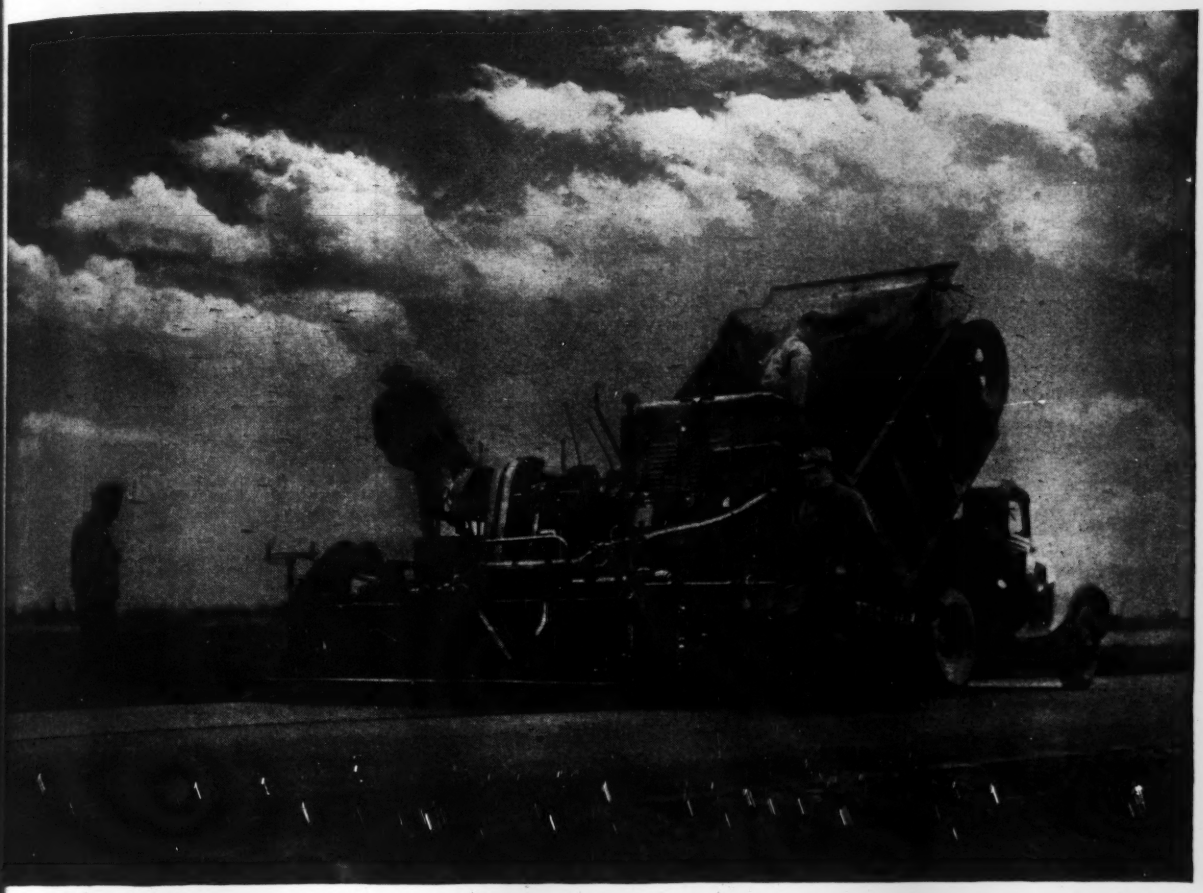
S. C., Hardeeville—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Hemingway—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Kershaw—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Lake City—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Lancaster—AIRPORT—City, grading airport. $55,000. CAA will help finance.



HOW A B-G FINISHER MAKES SMOOTHER ROADS

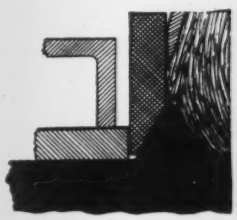
Here's a way to get a well packed surface without springy spots. An asphalt mat laid down with a Barber-Greene Tamping-Leveling Finisher is smooth, *firm*.

In many cases, a 5-ton roller adds only about an eighth of an inch compaction to the material *tamped* by a Barber-Greene. What's more, depressions in the base are not reflected in the finished surface. *The mat is equally packed over every variation in the subgrade.*

Hammering the hot mix 1200 times a minute, the bevelled face of the tamping bar actually compacts the material while striking it off. And to produce a mat of uniform density, the compacted mix is pushed forward and downward simultaneously.

In addition, the creeping travel of the tamper imparts a rolling movement to the loose mix in the spreading chamber. This prevents segregation of the material. And the weight of the follow-up screed — level with the stroking depth of the tamping bar — completes compaction . . . leaves a smooth, table-top surface.

A Barber-Greene *Tamping-Leveling* Finisher will help you build better, smoother, lower-cost roads. Write for B-G Finisher Catalog. Barber-Greene Company, Aurora, Illinois.



The tamping bar on a Barber-Greene Finisher compacts the hot mix while striking it off. Material is pushed forward and downward at the same time to fill all the voids in an uneven subgrade. A mat of equal density throughout is produced.

Barber-Greene B-G Constant Flow Equipment

on ROGERS TRAILERS

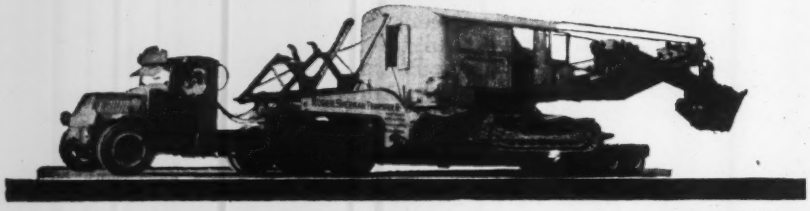
"GETTING there fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers. In the lightning speed of mechanized warfare this is accomplished by very ingenious methods.

Tanks now ride "Pick-a-Back" to battle on ROGERS TRAILERS so their ability to deal death in the worst encounters is unimpaired. Special ROGERS TRAILERS retrieve disabled tanks so they can be repaired and rushed back into battle again.

Where machines of war dish it out ROGERS TRAILERS are taking it . . . doing a real war job. Thousands of them are serving at home on the industrial front and when new models are again available after war contracts are completed, they will be even better designed and engineered — more efficient than their many predecessors, which have been so successfully operated by industry for many years!

EXPERIENCE *builds 'em* **PERFORMANCE** *sells 'em*

ROGERS BROS. CORP., ALBION, PENNA.



POSTWAR PROJECTS (Cont.)

S. C., Loris—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., McClellanville—AIRPORT—City, grading airport. $80,000. CAA will help finance.

S. C., McCormick—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Manning-Summerton—AIRPORT—Cities, grading airport. $210,000. CAA will help finance.

S. C., Moncks Corner—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Mount Pleasant—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Ridgeland—AIRPORT—City, grading airport. $55,000. CAA will help finance.

S. C., Rock Hill—AIRPORT—City, grading, paving, lighting airport. $140,000. CAA will help finance.

S. C., St. George—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., St. Mathews—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Saluda—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Summerville—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Sumter—AIRPORT—City, grading, paving, lighting airport. $440,000. CAA will help finance.

S. C., Union-Jonesville—AIRPORT—Cities, grading airport. $210,000. CAA will help finance.

S. C., Walhalla—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., West Columbia—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Whitmire—AIRPORT—City, grading airport. $140,000. CAA will help finance.

S. C., Winnsboro—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. C., Woodruff—AIRPORT—City, grading airport. $210,000. CAA will help finance.

S. D., Belle Fourche—AIRPORT—City, grading, lighting, paving airport. $385,000. CAA will help finance.

S. D., Beresford—AIRPORT—City, grading airport. $32,000. CAA will help finance.

S. D., Britton—AIRPORT—City, grading airport. $57,000. CAA will help finance.

S. D., Brookings—AIRPORT—City, grading, lighting airport. $93,000. CAA will help finance. CD 3/18/43—ENR 3/25/43.

S. D., Canton—AIRPORT—City, grading airport. $41,000. CAA will help finance.

S. D., Chamberlain—AIRPORT—City, grading, lighting airport. $83,000. CAA will help finance.

S. D., Clark—AIRPORT—City, grading airport. $36,000. CAA will help finance.

S. D., Chester—AIRPORT—City, grading airport. $98,000. CAA will help finance.

S. D., Custer—AIRPORT—City, grading airport. $98,000. CAA will help finance.

S. D., Dell Rapids—AIRPORT—City, grading airport. $41,000. CAA will help finance.

S. D., DeSmet—AIRPORT—City, grading airport. $36,000. CAA will help finance.

S. D., Faith—AIRPORT—City, grading airport. $41,000. CAA will help finance.

S. D., Faulkton—AIRPORT—City, grading airport. $27,000. CAA will help finance.

S. D., Flandreau—AIRPORT—City, grading airport. $67,000. CAA will help finance.

S. D., Gettysburg—AIRPORT—City, grading airport. $72,000. CAA will help finance.

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OSTWAR PROJECTS (Cont'd.)

S. D., **Gregory**—AIRPORT—City, grading irport. **$82,000.** CAA will help finance.

S. D., **Hot Springs**—AIRPORT—City, rading, paving, lighting airport. **$405,000.** AA will help finance.

S. D., **Ipswich**—AIRPORT—City, grading, irport. **$36,000.** CAA will help finance.

S. D., **Lemmon**—AIRPORT—City, grading, irport. **$118,000.** CAA will help finance.

S. D., **Madison**—AIRPORT—City, grading, ighting, airport. **$123,000.** CAA will help nance.

S. D., **Martin**—AIRPORT—City, grading **$56,000.** CAA will help finance.

S. D., **McIntosh**—AIRPORT—City, grading irport. **$26,000.** CAA will help finance.

S. D., **Milbank**—AIRPORT—City, grading irport. **$46,000.** CAA will help finance.

S. D., **Mobridge**—AIRPORT—City, grad- g, lighting airport. **$51,000.** CAA will elp finance.

S. D., **Murdo**—AIRPORT—City, grading irport. **$45,500.** CAA will help finance.

S. D., **Parker**—AIRPORT—City, grading irport. **$51,000.** CAA will help finance

S. D., **Platt**—AIRPORT—City, grading irport. **$46,000.** CAA will help finance.

S. D., **Redfield**—AIRPORT—City, grading, ighting airport. **$102,000.** CAA will help nance.

S. D., **Sisseton**—AIRPORT—City, grading irport. **$163,000.** CAA will help finance.

S. D., **Spearfish**—AIRPORT—City, grading, aving, lighting airport. **$485,000.** CAA ill help finance.

S. D., **Sturgis**—AIRPORT—City, grading irport. **$57,000.** CAA will help finance.

S. D., **Tyndall**—AIRPORT—City, grading irport. **$88,000.** CAA will help finance.

S. D., **Vermillion**—AIRPORT—City, grad- g, lighting airport. **$103,000.** CAA will elp finance.

S. D., **Wagner**—AIRPORT—City, grading irport. **$63,000.** CAA will help finance.

S. D., **Wasta**—AIRPORT—City, grading irport. **$25,500.** CAA will help finance.

S. D., **Webster**—AIRPORT—City, grading, ighting airport. **$133,000.** CAA will help nance.

S. D., **Wessington Springs**—AIRPORT— ity, grading airport. **$41,000.** CAA will elp finance.

S. D., **Winner**—AIRPORT—City, grading, ighting airport. **$113,000.** CAA will help nance.

S. D., **Yankton**—AIRPORT—City, grad- g, paving, lighting airport. **$274,000.** CAA ill help finance.

Tenn., **Athens**—AIRPORT—City, grading irport. **$110,000.** CAA will help finance.

Tenn., **Bolivar**—AIRPORT—City, grading irport. **$100,000.** CAA will help finance.

★ Tenn., **Bristol**—AIRPORTS—City, grad- ing, paving, lighting airport, **$425,000**; rading airport, **$110,000.** CAA will help nance.

Tenn., **Brownsville** — AIRPORT — City, rading airport. **$80,000.** CAA will help nance.

Tenn., **Bruceton**—AIRPORT—City, grad- g airport. **$80,000.** CAA will help nance.

Tenn., **Carthage**—AIRPORT—City, grading irport. **$110,000.** CAA will help finance.

★ Tenn., **Chattanooga** — AIRPORT — City, grading, paving, lighting airport. **1,230,000.** CAA will help finance.

★ Tenn., **Clarksville** — AIRPORT — City, grading, paving, lighting airport. **$85,000.** CAA will help finance.

Tenn., **Cleveland**—AIRPORT—City, grad- g, paving, lighting airport. **$475,000.** CAA ill help finance.

Tenn., **Clinton**—AIRPORT—City, grading, aving, lighting airport. **$475,000.** CAA ill help finance.

Tenn., **Collierville**—AIRPORT—City, grad- g airport. **$80,000.** CAA will help finance.

★ Tenn., **Columbia** — AIRPORT — City, grading, paving, lighting airport. **$885,- 00.** CAA will help finance.

Tenn., **Cookeville**—AIRPORT—City, grad- g airport. **$110,000.** CAA will help finance.

Tenn., **Covington**—AIRPORT—City, grad- g airport. **$110,000.** CAA will help finance.

Tenn., **Cowan-Winchester** — AIRPORT — ities, grading airport. **$110,000.** CAA will elp finance.

Tenn., **Crossville**—AIRPORT—City, grad- g airport. **$80,000.** CAA will help finance.

Tenn., **Dayton**—AIRPORT—City, grading irport. **$80,000.** CAA will help finance.

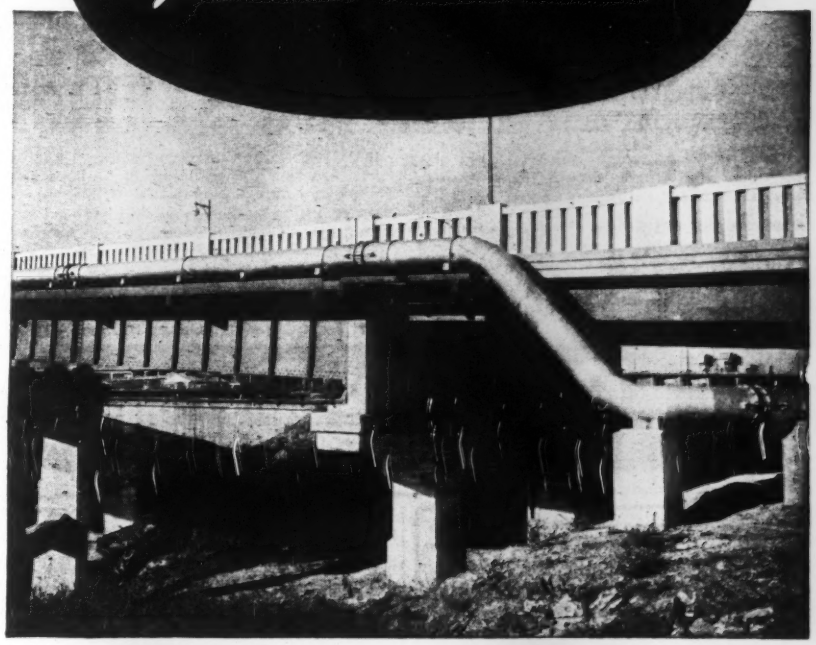
Tenn., **Dickson**—AIRPORT—City, grading irport. **$100,000.** CAA will help finance.

Tenn., **Dover**—AIRPORT—City, grading irport. **$55,000.** CAA will help finance.

Tenn., **Dunlap**—AIRPORT—City, grading irport. **$80,000.** CAA will help finance.

Tenn., **Dyersburg**—AIRPORT—City, grad- g, lighting airport. **$30,000.** CAA will elp finance.

Water Lines go in fast with "Spiral Welded"



Water supply lines go in fast when you use ARMCO Spiral Welded Pipe. Long lengths, up to 50 feet, mean fewer joints and less assembly work. Hauling and handling are speeded up because "Spiral Welded" is amply strong without being burdened by excess weight. Essential jobs go ahead on an all-out schedule.

Another advantage of ARMCO Spiral Welded Pipe is its efficient, trouble-free service. Consistent high flow capacity is assured by a smooth, spun enamel lining that prevents tuberculation. Costly cleaning is out and pumping costs remain low. Its ultimate strength is 50,000 to 60,000 pounds psi., and its high ductility prevents sudden rupture.

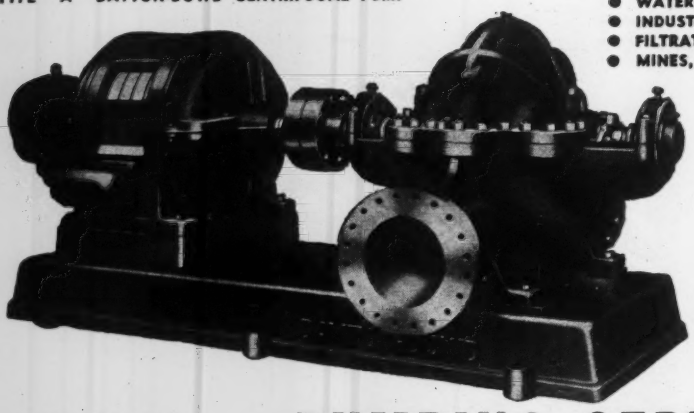
ARMCO Pipe is widely used *inside* and *outside* plants for many varied industrial applications. Diameters run from 6 to 36 inches; wall thicknesses from 1/64 to 1/2-inch. You have a wide choice of coatings, joints, and standard or special fittings. Write us for more information. The American Rolling Mill Co., Pipe Sales Division, 3571 Curtis St., Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

ARMCO

Spiral Welded Pipe

TYPE "A" DAYTON-DOWD CENTRIFUGAL PUMP



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- INDUSTRIAL PLANTS
- FILTRATION PLANTS
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PUMPING SERVICE

TYPES — Single stage, single suction, sizes 2" and 3". Single stage, double suction, sizes 2½" to 42". Capacities up to 60,000 G.P.M.

SPLIT CASE DESIGN — For easy accessibility. Available in either cast iron, chrome iron cast steel, bronze, monel and other alloys.

IMPELLER — High efficiency design. Made of cast bronze. Also available in KA-2 stainless steel, cast carbon steel monel or other alloys.

DRIVE UNITS — Pumps can be supplied with dual drive hookup. Electric motor and steam turbine. Electric motor with gas engine. Twin pumps also available with one electric motor.

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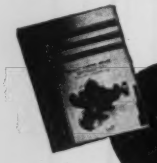

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EPPINGER AND RUSSELL CO.

Wood Preservers Since 1878

All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or

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Powerful, fast-stepping Mobile Crane . . . one-man operated . . . for "on and off" highway operations . . . simple to operate . . . (eliminates cut-up terrain, mutilated concrete docks and runways.)

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POSTWAR PROJECTS (Cont'd)

Tenn., Elizabethton — AIRPORT — City, grading airport. $110,000. CAA will help finance.

Tenn., Fayetteville — AIRPORT — City, grading airport. $110,000. CAA will help finance.

Tenn., Franklin—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Gallatin—AIRPORT—City, grading airport. $80,000. CAA will help finance.

Tenn., Gatlinberg—AIRPORT—City, grading airport. $160,000. CAA will help finance.

Tenn., Graham—AIRPORT—City, grading airport. $50,000. CAA will help finance.

Tenn., Greenville—AIRPORT—City, grading, paving, lighting airport. $475,000. CAA will help finance.

Tenn., Harriman—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Henderson—AIRPORT—City, grading, lighting airport. $120,000. CAA will help finance.

Tenn., Hohenwald—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Jellico—AIRPORT—City, grading airport. $80,000. CAA will help finance.

Tenn., Johnson City — AIRPORT — City, grading airport. $160,000. CAA will help finance.

Tenn., Kingsport—AIRPORT—City, grading airport. $160,000. CAA will help finance.

Tenn., Knoxville—AIRPORT—City, grading, paving, lighting airport. $435,000. CAA will help finance.

Tenn., Knoxville—RADIO STATION—S. Adcock, 513 S. Gay St., FM radio station $60,000.

Tenn., Lafayette—AIRPORT—City, grading airport. $80,000. CAA will help finance.

Tenn., LaFollette—AIRPORT—City, grading airport. $80,000. CAA will help finance.

Tenn., Lawrenceburg — AIRPORT — City, grading airport. $110,000. CAA will help finance.

Tenn., Lebanon—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Lenoir City — AIRPORT — City, grading airport. $110,000. CAA will help finance.

Tenn., Lewisburg—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Lexington—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Livingston—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., McMinnville — AIRPORT — City, grading airport. $110,000. CAA will help finance.

Tenn., Martin—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Mascot—AIRPORT—City, grading airport. $65,000. CAA will help finance.

★ **Tenn., Memphis** — AIRPORTS — City, grading airport $50,000, grading, paving, lighting airport $1,035,000. CAA will help finance.

Tenn., Milan — AIRPORT — City, grading airport. $80,000. CAA will help finance.

Tenn., Monteagle—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Monterey—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Morristown — AIRPORT — City, grading, paving, lighting airport. $400,000. CAA will help finance.

Tenn., Mountain City—AIRPORT—City, grading airport. $80,000. CAA will help finance.

Tenn., Murfreesboro — AIRPORT — City, grading airport. $80,000. CAA will help finance.

Tenn., Nashville—AIRPORT—City, grading airport $80,000, grading airport $110,000. CAA will help finance. CD 12/15/43. ENR 1/13/44.

Tenn., Newport—AIRPORT—City, grading airport. $135,000. CAA will help finance.

Tenn., Oneida—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Paris—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Pikeville—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Pulaski—AIRPORT—City, grading, paving, lighting airport. $425,000. CAA will help finance.

Tenn., Savannah—AIRPORT—City, grading airport. $110,000. CAA will help finance.

Tenn., Shelbyville—AIRPORT—City, grading, paving, lighting airport. $425,000. CAA will help finance.

Tenn., Smithville—AIRPORT—City, grading airport. $80,000. CAA will help finance.

Tenn., Soddy—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Somerville—AIRPORT—City, grading airport. $55,000. CAA will help finance.

Tenn., Sparta—AIRPORT—City, grading airport. $110,000. CAA will help finance.

STWAR PROJECTS (Cont'd.)

enn., **Spring City**—AIRPORT—City, grad- airport. **$55,000.** CAA will help finance.

enn., **Springfield**—AIRPORT—City, grad- airport. **$110,000.** CAA will help finance.

enn., **Tiptonville**—AIRPORT—City, grad- airport. **$55,000.** CAA will help finance.

enn., **Union City**—AIRPORT—City, pav- lighting airport. **$215,000.** CAA will finance.

enn., **Waverly**—AIRPORT—City, grad- airport. **$55,000.** CAA will help finance.

enn., **Whitwell**—AIRPORT—City, grad- airport. **$80,000.** CAA will help finance.

Tex., **Abilene**—AIRPORT—City, grading, paving, lighting airport **$1,617,990**; grad- paving, lighting airport **$90,563.** CAA help finance.

Tex., **Abilene**—BROADCASTING STATION eporter Broadcasting Co., Hilton Hotel, quency modulation radio broad- ting station. Over **$25,000.** Financing ilable. CD 10/11—ENR 11/2.

Tex., **Alamo**—AIRPORT—City, grading, ing, lighting airport. **$106,920.** CAA ll help finance.

Tex., **Alamo Heights** — AIRPORT — City, ding, paving airport. **$38,280.** CAA will p finance.

Tex., **Albany**—AIRPORT—City, grading, ing airport. **$110,710.** CAA will help ance.

Tex., **Alice** — AIRPORT — City, grading, ing, lighting airport. **$198,770.** CAA ll help finance.

Tex., **Alpine**—AIRPORT—City, grading, paving, lighting airport. **$660,594.** CAA ll help finance.

Tex., **Alvin**—AIRPORT—City, grading, paving, lighting airport. **$772,712.** CAA ll help finance.

Tex., **Amarillo**—AIRPORTS—City, grad- ing, paving, lighting airport **$339,020**, ding, paving, lighting airport **$338,547**, ding, paving, lighting airport **$661,573.**

Tex., **Amarillo** — BROADCASTING STA- ON—Amarillo Broadcasting Co., 109 E. 5 frequency modulating radio broadcast- station. **$40,000.** Funds available. CD —ENR 9/21.

Tex., **Anahuac**—AIRPORT—City, grading, ing airport. **$318,104.** CAA will help ance.

Tex., **Andrews**—AIRPORT—City, grading, ing, lighting airport. **$224,301.** CAA ll help finance.

Tex., **Archer City**—AIRPORT—City, grad- paving airport. **$83,250.** CAA will help ance.

Tex., **Arlington**—AIRPORTS—City, grad- ing, paving, lighting airport **$123,420**, ding, paving, lighting airport **$981,990.** AA will help finance.

Tex., **Athens**—AIRPORT—City, grading, paving, lighting airport. **$533,709.** CAA ll help finance.

Tex., **Atlanta**—AIRPORT—City, grading, ing, lighting airport. **$126,445.** CAA ll help finance.

Tex., **Asherton**—AIRPORT—City, grading, ing, lighting airport. **$67,320.** CAA will lp finance.

Tex., **Aspermont**—AIRPORT—City, grad- paving, lighting airport. **$196,526.** CAA ll help finance.

Tex., **Austin**—AIRPORTS—City, grading, ing, lighting airport **$183,854**, grading, ing, lighting airport **$177,522.** CAA will lp finance.

Tex., **Ballinger**—AIRPORT—City, grad- ing, paving, lighting airport. **$749,564.** AA will help finance.

Tex., **Balmorhea**—AIRPORT—City, grad- paving, lighting airport. **$266,915.** CAA ll help finance.

Tex., **Bandera**—AIRPORT—City, grading, ing, lighting airport. **$152,493.** CAA ll help finance.

Tex., **Barstow**—AIRPORT—City, grading, ing, lighting airport. **$286,330.** CAA ll help finance.

Tex., **Bastrop**—AIRPORT—City, grading, ing, lighting airport. **$79,189.** CAA will lp finance.

Tex., **Bay City**—AIRPORT—City, grad- ing, paving, ligning airport. **$812,888.** AA will help finance.

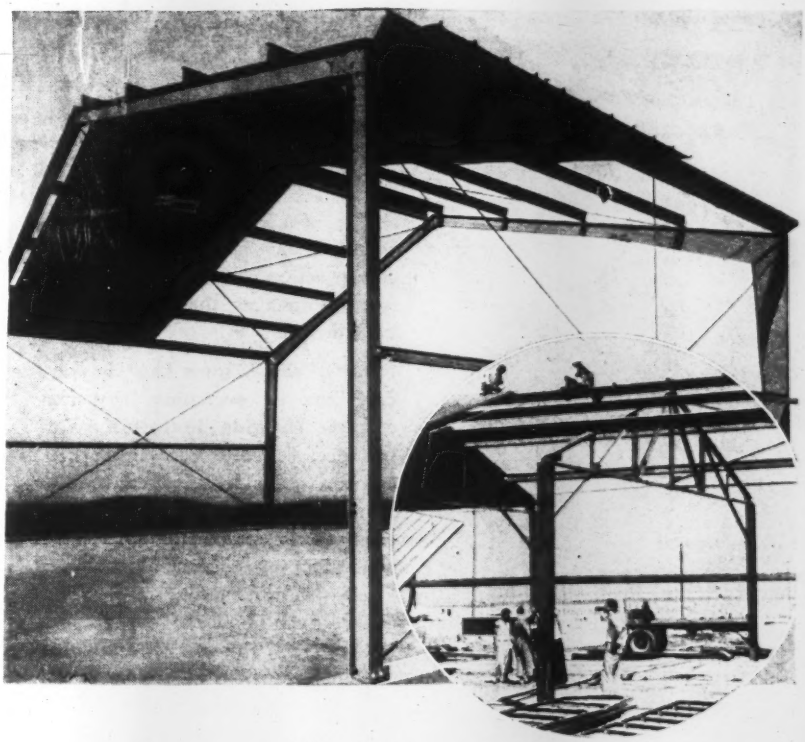
Tex., **Beaumont** — AIRPORTS — City, grading, paving, lighting airport **$991,636**, ading, paving, lighting airport **$302,254.** AA will help finance.

Tex., **Beaumont**—BROADCASTING STA- ON—K.R.I.C., Inc., Beaumont, frequency odulating radio broadcasting station. 0,000. Financing provided. CD 9/8— NR 9/21.

Tex., **Belton** — AIRPORT — City, grading, ing, lighting airport. **$110,347.** CAA ll help finance.

Tex., **Benavides**—AIRPORT—City, grad- ing, lighting airport. **$932,360.** CAA ll help finance.

Tex., **Big Lake**—AIRPORT—City, grading, ing, lighting airport. **$258,170.** CAA ll help finance.



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Prefabrication of buildings is so much talked of that many have gained the impression it is a new development.

Actually it is one that had reached maturity and was ready to prove its full worth on a tremendous scale with the coming of war.

Particularly is this true of prefabricated steel buildings. In more than 30 years of specialized experience Butler engineers have brought prefabricated steel buildings through one practical stage after another—proved their "mettle" in a score of industries for hundreds of housing purposes.

In all that time prefabrication of steel buildings in Butler factories has not remained static. Witness the photographs above. The one in the circle is a trussed roof Butler steel building being erected for early military use. But, war needs change. To meet them, Butler engineers designed and developed the **Rigid Frame** trussless structure in top photograph.

All the advantages, and they are many, which this brought to the military, will be available to all industry after victory. Remember to check these in the early stages of your postwar planning.

Address all inquiries to: 7418 East 13th St., Kansas City 3, Mo., or 918 Sixth Ave. S. E., Minneapolis 14, Minn.

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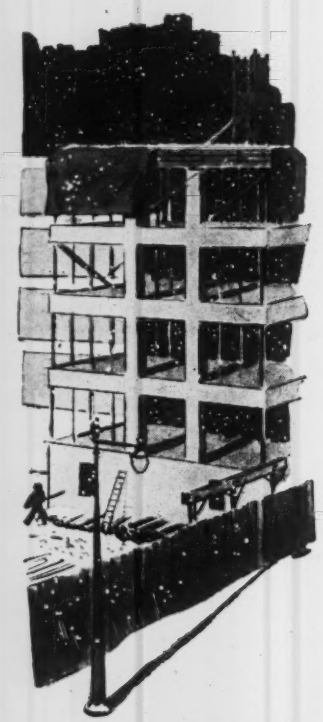
Stop WINTER LAG* IN CONCRETE



Winter Lag* is the progressively slower action of concrete in acquiring strength as the thermometer goes down.

Much of this Winter Lag* in concrete can be overcome by using calcium chloride in-the-mix. For instance, concrete containing 2% calcium chloride, exposed to 40° temperature, will acquire safe strength in practically the same time that plain concrete does at 70°. Used with other normal protection, concrete can be placed on favorable schedules all the year 'round. This is the least expensive as well as the most effective means of speeding up cold weather concrete schedules.

Besides the high early strength induced by calcium chloride you get built-in curing — automatic curing at no extra cost and you get higher strength *at all ages.*

Ask for our Bulletin 28, "Early Strength Concrete."

CALCIUM CHLORIDE ASSOCIATION
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CALCIUM CHLORIDE

SPEEDS WINTER CONCRETE CONSTRUCTION

POSTWAR PROJECTS

Tex., Big Spring—A... ing, paving airport $... lighting airport $303,... finance.

Tex., Boerne—AIR... paving, lighting airport... help finance.

★ **Tex., Bonham**—A... ing, paving, lighti... CAA will help finance.

★ **Tex., Borger**—AIR... paving, lighting a... will help finance.

Tex., Bowie — AIRP... paving, lighting airport... help finance.

★ **Tex., Brady**—AIR... paving, lighting a... will help finance.

★ **Tex., Breckenridge**... grading, paving, li... 970. CAA will help fi...

Tex., Bremond—AIR... paving, lighting airport... help finance.

★ **Tex., Brenham**—AI... ing, paving, lighti... CAA will help finance.

Tex., Brownfield—AI... ing, paving, lighting a... will help finance.

Tex., Brownsville—AIRPORT—... ing, paving airport. $454,410. CAA ... finance.

Tex., Brownsville—BROADCASTING STA... TION—Brownsville Herald, Brownsv... broadcasting station, $25,000. Financ... available.

Tex., Burkburnett—AIRPORT—... ing, paving, lighting airport. $77,950. ... will help finance.

★ **Tex., Burnet**—AIRPORT—... paving, lighting airport. $1,043,196. ... will help finance.

Tex., Caldwell—AIRPORT—City, grad... paving airport. $65,532. CAA will help ... nance.

★ **Tex., Cameron**—AIRPORT—City, grad... ing, paving, lighting airport. $730,... CAA will help finance.

Tex., Canadian—AIRPORT—City, grad... paving, lighting airport. $333,960. CAA ... help finance.

Tex., Canyon—AIRPORT—City, grad... lighting, paving airport. $368,467. CAA ... help finance.

Tex., Carthage—AIRPORT—City, grad... paving, lighting airport. $178,080. CAA ... help finance.

Tex., Castolon—AIRPORT—City, grad... paving, lighting airport. $252,652. CAA ... help finance.

Tex., Center — AIRPORT — City, grad... paving, lighting airport. $195,327. CAA ... help finance.

Tex., Centerville—AIRPORT—City, grad... ing, paving airport. $96,872. CAA will ... finance.

★ **Tex., Childress**—AIRPORT—City, grad... ing, paving, lighting airport. $561,... CAA will help finance.

★ **Tex., Cisco** — AIRPORT — City, grad... paving, lighting airport. $860,920. CA... will help finance.

Tex., Clarendon—AIRPORT—City, grad... lighting airport. $392,491. CAA will ... finance.

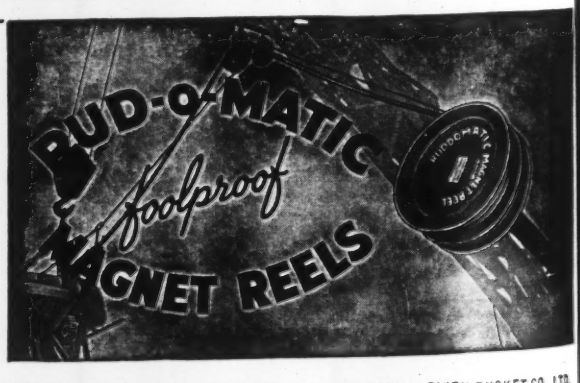
Tex., Clarksville—AIRPORT—City, grad... ing, paving, lighting airport. $329,840. CA... will help finance.

Tex., Claude — AIRPORT — City, grad... paving, lighting airport. $265,375. CAA ... help finance.

Tex., Cleburne—AIRPORT—City, grad... paving, lighting airport, $767,297. CAA ... help finance.

The Rud-o-Matic Combination Magnet Reel and Tagline is a radical departure from the usual reel, something which is brand new and which no one else can offer. It is operated on a string principle for tension. Tagline cable is attached to magnet with sufficient tension to steady, then electric cable is fastened to connections on magnet, leaving same a little slack. As both drums revolve together, electric cable always maintains the degree of slackness originally set. This feature eliminates any possibility of electric cable being pulled apart or jerked loose from the connections, thus insuring a long life for it. Most of the crane manufacturers have adopted Rud-o-Matics as standard equipment.

McCAFFREY-RUDDOCK TAGLINE CORP.
2121 East 25th Street Los Angeles 11, California



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TWAR PROJECTS (Cont'd.)

Tex., Cleveland—AIRPORT—City, grading, ing, airport. $90,726. CAA will help fi- ce.

Tex., Coldspring—AIRPORT—City, grad- paving airport. $83,210. CAA will help nce.

Tex., Colman—AIRPORT—City, grading, lighting airport. $647,735. CAA will help nce.

Tex., College Station — AIRPORT — City, ing, lighting airport. $95,590. CAA will finance.

Tex., Colorado City — AIRPORT — City, grading, paving, lighting airport. $567,- CAA will help finance.

Tex., Columbus—AIRPORT—City, grading, ing airport. $82,936. CAA will help fi- ce.

Tex., Comanche—AIRPORT—City, grading, ing, lighting airport. $139,920. CAA will finance.

Tex., Commerce—AIRPORT—City, grad- paving, lighting airport. $258,555. CAA help finance.

Tex., Comstock — AIRPORT — City, grad- paving, lighting airport. $150,678. CAA help finance.

Tex., Conroe — AIRPORT — City, lighting port. $31,548. CAA will help finance.

Tex., Cooper — AIRPORT — City, grading, ing airport. $66,165. CAA will help fi- ce.

Tex., Corpus Christi—AIRPORTS—City, grading, paving, lighting airport $617,990. ding, paving, lighting airport $1,764,510. A will help finance.

Tex., Corrigan—AIRPORT—City, grading, ing airport. $70,780. CAA will help fi- ce.

Tex., Corsicana—AIRPORT—City, grad- ing, paving, lighting airport. $622,589. A will help finance.

Tex., Cotulla—AIRPORT—City, grading, paving, lighting airport. $830,962. CAA l help finance.

Tex., Crane—AIRPORT—City, grading, ing, lighting airport. $437,196. CAA l help finance.

Tex., Crockett—AIRPORT—City, grad- ing, paving, lighting airport. $783,522. A will help finance.

Tex., Crosbyton—AIRPORT—City, grad- paving, lighting airport. $297,825. A will help finance.

Tex., Crowell—AIRPORT—City, grading, ing airport. $114,050. CAA will help nce.

Tex., Crystal City—AIRPORT—City, grading, paving, lighting airport. $611,- CAA will help finance.

Tex., Cuero—AIRPORT—City, grading, paving, lighting airport. $547,310. CAA l help finance.

Tex., Daingerfield—AIRPORT—City, grad- paving, lighting airport. $199,166. A will help finance.

Tex., Dallas — BROADCASTING STA- ON—A. H. Belo Corp., Commerce and mar Sts., frequency modulating radio oadcasting station. $40,000. Financing ailable. CD 9/12—ENR 9/21.

Tex., Dallas—BROADCASTING STATION —K.R.L.D. Radio Corp., Adolphus Hotel. quency modulation radio broadcasting ation. $40,000. Funds available. CD 1/1—ENR 11/2.

Tex., Dayton—AIRPORT—City, grading, ing airport. $62,370. CAA will help nance.

Tex., Decatur—AIRPORT—City, grading, ing, lighting airport. $121,660. CAA ll help finance.

Tex., DeKalb—AIRPORT—City, grading, ing, lighting airport. $81,917. CAA will lp finance.

Tex., Del Rio—AIRPORT—City, grading, ing, lighting airport. $481,830. CAA ll help finance.

Tex., Denison—AIRPORT—City, grading, ing, lighting airport. $82,445. CAA will lp finance. CD 9/15—ENR 10/16.

Tex., Denton—AIRPORT—City, grading, ing, lighting airport. $476,283. CAA ll help finance.

Tex., Denver City—AIRPORT—City, grad- paving, lighting airport. $488,939. A will help finance.

Tex., Dimmitt—AIRPORT—City, grading, ing, lighting airport. $227,117. CAA ll help finance.

Tex., Dryden—AIRPORT—City, grading, ing, lighting airport. $95,480. CAA will lp finance.

Tex., Dublin — AIRPORT — City, grading, ing airport. $85,850. CAA will help nance.

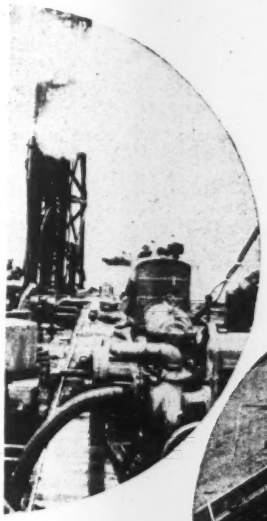
Tex., Dumas—AIRPORT—City, grading, ing, lighting airport. $264,517. CAA ll help finance.

Tex., Eagle Pass—AIRPORT—City, grad- paving, lighting airport. $134,255. CAA ll help finance.

Tex., Eastland-Ranger—AIRPORT—Cit- ies, grading, lighting airport. $673,800. A will help finance.

Tex., Eden—AIRPORT—City, grading, ing, lighting airport. $169,290. CAA will lp finance.

GOODALL Construction Keeps HOSE, BELTING, BOOTS, CLOTHING on the Job Longer!



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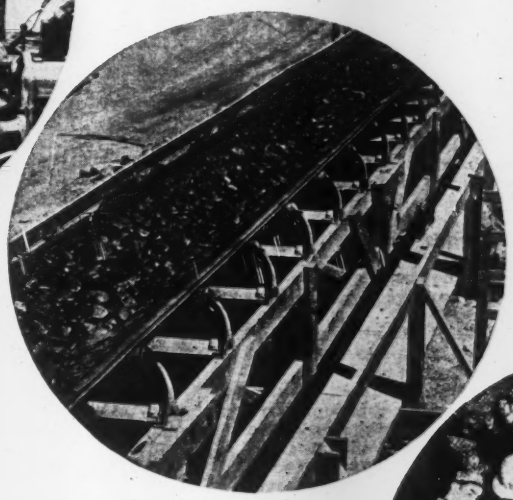

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STREAMLINED
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• Users everywhere are realizing the many profitable advantages of the Johnson Clamshell Bucket, the bucket that combines clean, fast digging with full protection against wear.

All-welded construction eliminates rivets, bolts, and other impeding projections, assuring best balance and better digging quality in all kinds of material.

Renewable lip edge-bar of tough manganese steel combats wear and is easily replaceable in the field.

Needle-bearing mounted closing sheaves permit free-running cable action at all times, bearings are sealed against entrance of dirt and moisture.

Lower sheaves are fully protected by heavy rugged steel plates. All sheaves have large diameter for increased cable life.

General purpose type, 1/2 to 1-1/2 yards capacity in stock for immediate delivery.

Johnson Bucket in open position showing heavy shock-preventing protection plate for lower sheave assembly.

Johnson Clamshell Bucket showing manganese steel teeth designed for smooth speedy digging.

The C. S. Johnson Company
Champaign, Illinois

POSTWAR PROJECTS (Cont'd.)

★**Tex., Edinburg**—AIRPORT—City, grading, paving, lighting airport. **$616,990.** CAA will help finance.

Tex., Edna—AIRPORT—City, grading, paving, lighting airport. **$84,188.** CAA will help finance.

★**Tex., El Campo**—AIRPORT—City, grading, paving, lighting airport. **$884,925.** CAA will help finance.

Tex., Eldorado—AIRPORT—City, grading, paving, lighting airport. **$61,325.** CAA will help finance.

★**Tex., El Paso**—AIRPORTS—City, grading, paving, lighting airport **$311,289,** grading, paving airport **$98,230,** grading, paving, lighting airport **$497,940.** CAA will help finance. CD 4/14—ENR 5/4.

Tex., Electra—AIRPORT—City, grading, paving, lighting airport. **$301,411.** CAA will help finance.

Tex., Elgin—AIRPORT—City, grading, paving, lighting airport. **$149,590.** CAA will help finance.

★**Tex., Ennis-Waxahachie** — AIRPORT — Cities, grading, paving, lighting airport. **$785,160.** CAA will help finance.

Tex., Fabens—AIRPORT—City, grading, paving, lighting airport. **$204,442.** CAA will help finance.

Tex., Fairfield—AIRPORT—City, grading, paving airport. **$66,322.** CAA will help finance.

★**Tex., Falfurrias**—AIRPORT—City, grading, paving, lighting airport. **$711,139.** CAA will help finance.

Tex., Farwell—AIRPORT—City, grading, paving, lighting airport. **$258,181.** CAA will help finance.

Tex., Floydada—AIRPORT—City, grading, paving, lighting airport. **$298,925.** CAA will help finance. CD 4/14—ENR 5/4.

Tex., Fort Davis—AIRPORT—City, grading, paving, lighting airport. **$248,314.** CAA will help finance.

★**Tex., Fort Stockton**—AIRPORT—City, grading, paving, lighting airport. **$745,327.** CAA will help finance.

★**Tex., Fort Worth**—AIRPORTS—City, grading, paving, lighting airport **$88,363,** grading, paving, lighting airport **$897,210,** grading, paving, lighting airport **$274,500,** grading, paving airport **$110,000.** CAA will help finance.

Tex., Fredericksburg — AIRPORT — City, grading, paving, lighting airport. **$102,630.** CAA will help finance. CD 1/28/44—ENR 2/10/44.

★**Tex., Freeport**—AIRPORT—City, grading, paving, lighting airport. **$864,952.** CAA will help finance.

★**Tex., Freer**—AIRPORT—City, grading, paving, lighting airport. **$970,640.** CAA will help finance.

Tex., Friona—AIRPORT—City, grading, paving, lighting airport. **$194,513.** CAA will help finance.

★**Tex., Galveston**—AIRPORT—City, grading, paving, lighting airport. **$637,393.** CAA will help finance.

Tex., Galveston—BROADCASTING STATION—K.L.U.F. Broadcasting Co., Inc., 6002 Bway., frequency modulation radio broadcasting station. **$40,000.** Financing available.

Tex., Galveston — STADIUM, etc. — Bd. Trustees Galveston Public Schools, Alamo 5200 N½, athletic stadium, ball park, drill field, drainage, etc. **$60,000.** Financing not provided.

Tex., Gatesville—AIRPORT—City, grading, paving, lighting airport. **$152,768.** CAA will help finance.

★**Tex., Georgetown** — AIRPORT — City, grading, paving, lighting airport. **$840,224.** CAA will help finance.

Tex., George West—AIRPORT—City, grading, paving, lighting airport. **$146,235.** CAA will help finance.

Tex., Giddings—AIRPORT—City, grading, paving, lighting airport. **$108,274.** CAA will help finance.

Tex., Gilmer—AIRPORT—City, grading, paving, lighting airport. **$107,690.** CAA will help finance.

Tex., Gladewater—AIRPORT—City, grading, paving, lighting airport. **$352,704.** CAA will help finance.

Tex., Goldthwaite—AIRPORT—City, grading, paving, lighting airport. **$169,290.** CAA will help finance.

★**Tex., Gonzales**—AIRPORT—City, grading, paving, lighting airport. **$1,055,208.** CAA will help finance.

★**Tex., Goose Creek**—AIRPORT—City, grading, paving, lighting airport. **$898,196.** CAA will help finance.

★**Tex., Graham**—AIRPORT—City, grading, paving, lighting airport. **$790,625.** CAA will help finance.

Tex., Granbury—AIRPORT—City, grading, paving airport. **$64,900.** CAA will help finance.

Tex., Grandfalls—AIRPORT—City, grading, paving airport. **$210,727.** CAA will help finance.

Tex., Groveton—AIRPORT—City, grading, paving airport. $[illegible] help finance.

Tex., Halletsville—AIRPORT—City, grading, paving, lighting [illegible] CAA will help finance.

Tex., Hamilton—AIRPORT—City, grading, paving, lighting [illegible] will help finance.

Tex., Hamlin—AIRPORT—City, grading, paving, lighting airport $[illegible] help finance.

★**Tex., Harlingen**—AIRPORT—City, grading, paving, lighting [illegible] CAA will help finance.

Tex., Harlingen—BROADCASTING STATION—Harbenito Broadcasting Co., Harlingen, frequency modulation broadcasting station. $[illegible] available. CD 10/11—ENR 11/2.

Tex., Harlingen—BROADCASTING STATION—Valley Publishing Co., Harlingen, frequency modulation broadcasting station. $[illegible] available. CD 2/23.

Tex., Harper—AIRPORT—City, grading, paving, lighting airport $157,993. CAA will help finance.

Tex., Haskell—AIRPORT—City, grading, paving, lighting airport $282,425. CAA will help finance.

★**Tex., Hearne**—AIRPORT—City, grading, paving, lighting airport $549,450. CAA will help finance.

★**Tex., Hebbronville** — AIRPORT — City, grading, paving, lighting airport $[illegible] 918. CAA will help finance.

Tex., Hempstead—AIRPORT—City, grading, paving airport. $97,388. CAA will help finance.

★**Tex., Henderson**—AIRPORT—City, grading, paving, lighting airport $538,[illegible] CAA will help finance.

Tex., Henrietta—AIRPORT—City, grading, paving, lighting airport $72,450. CAA will help finance.

★**Tex., Hereford**—AIRPORT—City, grading, paving, lighting airport. $491,[illegible] CAA will help finance.

Tex., Hico—AIRPORT—City, grading, paving, lighting airport $152,768. CAA will help finance.

★**Tex., Hillsboro**—AIRPORT—City, grading, paving, lighting airport. $800,[illegible] CAA will help finance.

★**Tex., Houston**—AIRPORTS—City, grading, paving, lighting airport $1,570,[illegible] grading, paving, lighting airport $838,[illegible] CAA will help finance.

Tex., Houston — BROADCASTING STATION—Houston Printing Corp., 2318 Polk St., frequency modulation radio broadcasting station. **$40,000.** Financing available.

Tex., Houston — BROADCASTING STATION—K.T.R.H. Broadcasting Co., Rice Hotel, frequency modulation radio broadcasting station. **$40,000.** Financing available.

Tex., Humble—AIRPORT—City, grading, paving airport. $100,493. CAA will help finance.

★**Tex., Huntsville**—AIRPORT—City, grading, paving, lighting airport. $750,[illegible] CAA will help finance.

Tex., Iraan—AIRPORT—City, grading, paving airport. $84,546. CAA will help finance.

Tex., Jacksboro—AIRPORT—City, grading, paving airport. $97,760. CAA will help finance.

★**Tex., Jacksonville** — AIRPORT — City, grading, paving, lighting airport. $[illegible] 427. CAA will help finance.

Tex., Jasper—AIRPORT—City, grading, paving airport. $73,004. CAA will help finance.

Tex., Jayton—AIRPORT—City, grading, paving, lighting airport. $188,683. CAA will help finance.

Tex., Jefferson—AIRPORT—City, grading, paving, lighting airport. $148,900. CAA will help finance.

Tex., Johnson City—AIRPORT—City, grading, paving, lighting airport. $196,[illegible] CAA will help finance.

Tex., Junction—AIRPORT—City, grading, paving, lighting airport. $115,093. CAA will help finance.

Tex., Kaufman—AIRPORT—City, grading, paving, lighting airport. $73,315. CAA will help finance.

★**Tex., Kenedy**—AIRPORT—City, grading, paving, lighting airport. $728,695. CAA will help finance.

Tex., Kent—AIRPORT—City, grading, paving airport. $129,800. CAA will help finance.

Tex., Kermit—AIRPORT—City, grading, paving, lighting airport. $303,380. CAA will help finance.

★**Tex., Kerrville**—AIRPORT—City, grading, paving, lighting airport. $661,[illegible] CAA will help finance.

Tex., Kilgore—AIRPORT—City, grading, paving, lighting airport. $102,630. CAA will help finance.

STWAR PROJECTS (Cont'd.)

Tex., **Killeen**—AIRPORT—City, grading, ing, lighting airpoort. **$57,442.** CAA will p finance.

Tex., **Kingsville**—AIRPORT—City, grad- paving, lighting airport. **$108,361.** CAA help finance.

Tex., **Kirbyville**—AIRPORT—City, grad- paving, lighting airport. **$114,026.** CAA help finance.

Tex., **Knox City**—AIRPORT—City, grad- paving, lighting airport. **$217,415.** CAA help finance.

Tex., **La Grange**—AIRPORT—City, grad- paving, lighting airport. **$119,427.** CAA help finance.

Tex., **Lamesa**—AIRPORT—City, grad- ing, paving, lighting airport. **$705,404.** A will help finance.

Tex., **Lampasas**—AIRPORT—City, grad- airport. **$65,294.** CAA will help finance.

Tex., **Laredo**—AIRPORT—City, grading, paving, lighting airport. **$846,329.** CAA l help finance.

Tex., **Leakey**—AIRPORT—City, grading, ing, lighting airport. **$152,713.** CAA l help finance.

Tex., **Levelland**—AIRPORT—City, grading, ing, lighting airport. **$307,109.** CAA ll help finance.

Tex., **Littlefield**—AIRPORT—City, grad- —lighting, paving airport. **$218,328.** A will help finance.

Tex., **Livingston**—AIRPORT—City, grad- —paving airport. **$102,661.** CAA will p finance.

Tex., **Llano**—AIRPORT—City, grading, paving, lighting airport. **$635,591.** CAA ll help finance.

Tex., **Lockhart**—AIRPORT—City, grad- ing, paving, lighting airport. **$881,738.** A will help finance.

Tex., **Lockney**—AIRPORT—City, grading, ing, lighting airport. **$243,309.** CAA will lp finance.

Tex., **Longview**—AIRPORTS—City, grad- paving, lighting airport **$92,150**; grad- paving, lighting airport **$241,720.** CAA ll help finance.

Tex., **Lubbock**—AIRPORTS—City, grad- ing, paving, lighting airport **$320,155**; ading, paving, lighting airport **$219,-** grading, paving, lighting airport **$226,-** CAA will help finance.

Tex., **Lufkin**—AIRPORT—City, grading, paving, lighting airport. **$813,335.** CAA ll help finance.

Tex., **Luling**—AIRPORT—City, grading, paving, lighting airport. **$900,251.** CAA ll help finance.

Tex., **McAllen**—AIRPORT—City, grading, paving, lighting airport. **$915,145.** CAA ll help finance.

Tex., **McAllen**—BROADCASTING STA- ION—Valley Evening Monitor, McAllen, dio broadcasting station, **$25,000.** Financing vailable. CD 12/8—ENR 12/28.

Tex., **McCamey**—AIRPORT—City, grading, ving, lighting airport. **$253,231.** CAA ill help finance.

Tex., **McKinney**—AIRPORT—City, grad- ing, paving, lighting airport. **$690,571.** AA will help finance.

Tex., **McLean**—AIRPORT—City, grading, ving, lighting airport. **$304,909.** CAA ill help finance.

Tex., **Madisonville**—AIRPORT—City, grad- ng, paving, lighting airport. **$100,848.** CAA ill help finance.

Tex., **Marathon**—AIRPORT—City, grading, aving, lighting airport. **$120,395.** CAA will elp finance.

Tex., **Marfa** — AIRPORT — City, grading, aving, lighting airport. **$478,632.** CAA will elp finance.

Tex., **Marlin**—AIRPORT—City, grading, paving, lighting airport. **$641,880.** CAA ill help finance.

Tex., **Marshall**—AIRPORT—City, grad- ing, paving, lighting airport. **$715,143.** AA will help finance.

Tex., **Mason** — AIRPORT — City, grading, aving, lighting airport. **$388,284.** CAA ill help finance.

Tex., **Matador**—AIRPORT—City, grading, aving, lighting airport. **$307,637.**

Tex., **Mathis**—AIRPORT—City, grading, aving, lighting airport. **$150,678.** CAA ill help finance.

Tex., **Memphis**—AIRPORT—City, grad- ing, paving, lighting airport. **$696,003.** AA will help finance.

Tex., **Menard**—AIRPORT—City, grading, aving, lighting airport. **$162,290.** CAA ill help finance.

Tex., **Mercedes**—AIRPORT—City, grad- ing, paving, lighting airport. **$780,560.** AA will help finance.

Tex., **Meridian**—AIRPORT—City, grading, aving, lighting airport. **$155,793.** CAA ill help finance.

Tex., **Mertzon**—AIRPORT—City, grading, aving, lighting airport. **$141,801.** CAA ill help finance.

PROPER SEWAGE TREATMENT demands adequate air

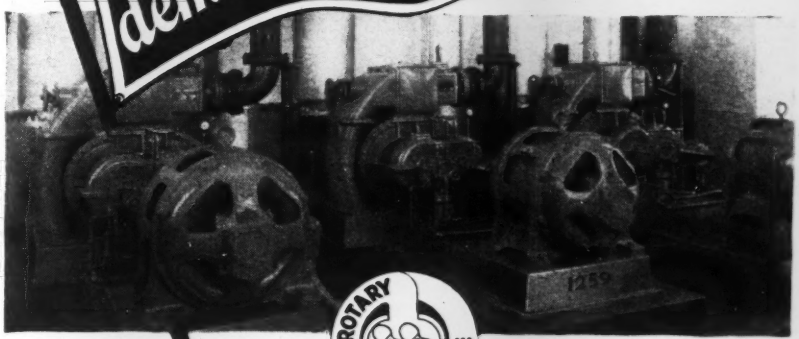

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Photo shows 3 "R-C" Multi-Capacity Blowers. Capacities of each unit 583/1166/1750 CFM, at 6 to 7 lbs. pressure.

The Roots-Connersville Multi-Capacity Blower is one of the most effective means of obtaining an air supply flexible and adequate enough to meet varying conditions.

The blower chamber is divided into two sections of different widths. Each represents a separate rotary positive blower, but for *economy, compactness,* and *convenience,* both sets of impellers are assembled in one case and carried on the same shafts and bearings.

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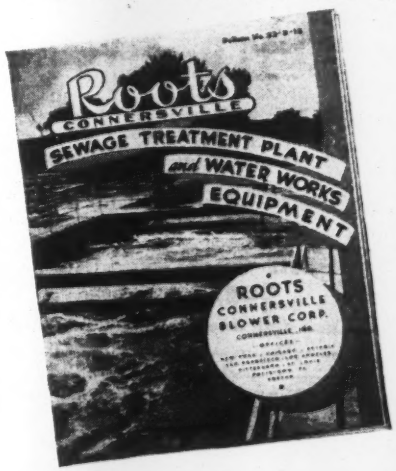

BULLETIN 23-B-12

—will aid correct planning and specifying. It gives much interesting and helpful data on aerating blowers, digester gas meters, and filter vacuum pumps. A copy of this Bulletin will be mailed on request.

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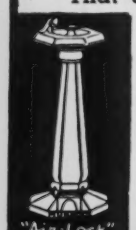

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POSTWAR PROJECTS

★**Tex., Mexia**—AIRP... paving, lighting ... will help finance. $655,11...

Tex., Midland—AIRP... paving, lighting airp... will help finance. $477,80...

★**Tex., Mineola**—AIRP... paving, lighting air... will help finance. $510,340.

Tex., Mineral Wel... grading, paving, lighti... CAA will help finance. $351,8...

Tex., Mission — PA... Grande Valley State P... Bd., Austin, 587 acre s... wharves, athletic cou... and grounds developme... purchased. $300,000.

★**Tex., Monahans**—AIR... ing, paving, lighting ... CAA will help finance. $601,2...

Tex., Morton—AIRP... paving, lighting airport ... will help finance. $280,709.

★**Tex., Mount Pleasant** ... grading, paving, ligh... 680. CAA will help fina... $35...

Tex., Muleshoe—AIRP... paving, lighting airport ... will help finance. $272,432.

Tex., Munday—AIRPO... paving airport. $47,740 ... finance.

★**Tex., Nacogdoches** — AIRPORT ... grading paving, lighting airport ... 695. CAA will help finance. $68...

★**Tex., Navasota**—AIRPORT—City, ... ing, paving, lighting airport, $668,21...
CAA will help finance.

★**Tex., New Braunfels** ... grading, paving, ... $606,980. ... airport...

Tex., Newton—AIRPORT—City, grading ... paving airport. $63,463. CAA will help ... finance.

Tex., Nixon — AIRPORT — City, grading ... paving, lighting airport. $158,576. CAA ... will help finance.

Tex., Nocona—AIRPORT—City, grading ... paving, lighting airport. $93,450. CAA will ... help finance.

Tex., Odem — AIRPORT — City, grading ... paving, lighting airport. $63,239. CAA ... will help finance.

★**Tex., Odessa**—AIRPORT—City, grading ... lighting airport. $1,009,272. CAA will ... help finance.

Tex., O'Donnell — AIRPORT — City, grading ... ing, paving airport. $95,789. CAA will help ... finance.

Tex., Olney — AIRPORT — City, grading ... paving, lighting airport. $116,490. CAA ... will help finance.

★**Tex., Orange**—AIRPORT—City, grading ... paving, lighting airport. $713,570. CAA ... will help finance.

Tex., Ozona — AIRPORT — City, grading ... paving, lighting airport. $259,248. CAA ... will help finance.

Tex., Paducah—AIRPORT—City, grading ... paving, lighting airport. $306,863. CAA ... will help finance.

Tex., Palestine—AIRPORT—City, grading ... paving, lighting airport. $495,033. CAA ... will help finance.

★**Tex., Pampa**—AIRPORT—City, grading ... paving, lighting airport. $1,084,473. ... CAA will help finance.

Tex., Panhandle—AIRPORT—City, grading ... ing, paving, lighting airport. $286,495. ... CAA will help finance.

Tex., Paris — AIRPORT — City, grading ... paving, lighting airport. $46,992. CAA ... will help finance.

Tex., Pearsall—AIRPORT—City, grading ... paving, lighting airport. $93,610. CAA will ... help finance.

Tex., Perryton—AIRPORT—City, grading ... paving, lighting airport. $180,543. CAA ... will help finance.

Tex., Pittsburg—AIRPORT—City, grading ... paving, lighting airport. $91,300. CAA ... will help finance.

★**Tex., Plainview**—AIRPORT—City, grading ... ing, paving, lighting airport. $817,619. ... CAA will help finance. CD 10-23-...
11/2.

Tex., Pleasanton—AIRPORT—City, grading ... ing, paving, lighting airport. $111,901. ... CAA will help finance.

★**Tex., Port Aransas**—AIRPORT—City, ... grading, paving, lighting airport. $238,... 440. CAA will help finance.

★**Tex., Port Arthur** — AIRPORT — City, ... grading, paving, lighting airport. $255,... 810. CAA will help finance.

★**Tex., Port Lavaca** — AIRPORT — City, ... grading, paving, lighting airport. $253,... 690. CAA will help finance.

Tex., Post—AIRPORT—City, grading, pav... ing, lighting airport. $146,157. CAA will ... help finance.

STWAR PROJECTS (Cont'd.)

Tex., **Poteet**—AIRPORT—City, grading, ing, lighting airport. **$162,502.** CAA will p finance.

Tex., **Presidio**—AIRPORT—City, grading, ing, paving, lighting airport. **$556,998.** A will help finance.

Tex., **Quanah**—AIRPORT—City, grading, ing airport. **$291,180.** CAA will help

Tex., **Ralls**—AIRPORT—City, grading, ing, lighting airport. **$292,699.** CAA l help finance.

Tex., **Raymondville** — AIRPORT — City, grading, paving, lighting airport. **$660,-** CAA will help finance.

Tex., **Red Bluff Lake**—AIRPORT—City, ding, paving, lighting airport. **$464,959.** A will help finance.

Tex., **Refugio** — AIRPORT — City, grading, paving, lighting airport. **$596,514.** A will help finance.

Tex., **Rio Grande City**—AIRPORT—City, ing, paving, lighting airport. **$79,574.** A will help finance.

Tex., **Robert Lee**—AIRPORT—City, grading, paving, lighting airport. **$141,801.** CAA l help finance.

Tex., **Robstown**—AIRPORT—City, grading, paving, lighting airport. **$384,725.** CAA l help finance.

Tex., **Rock Springs**—AIRPORT—City, grading, paving, lighting airport. **$768,-** CAA will help finance.

Tex., **Rockdale**—AIRPORT—City, grading, ing, lighting airport. **$112,882.** CAA l help finance.

Tex., **Rockport**—AIRPORT—City, paving, hting airport. **$62,370.** CAA will help ance.

Tex., **Roscoe** — AIRPORT — City, grading, ing, lighting airport. **$283,437.** CAA will lp finance.

Tex., **Rosenberg**—AIRPORT—City, grading, ing, paving, lighting airport. **$833,882.** AA will help finance.

Tex., **Rotan** — AIRPORT — City, grading, ing, lighting airport. **$251,910.** CAA will lp finance.

Tex., **Rusk** — AIRPORT — City, grading, ing, lighting airport. **$383,380.** CAA will lp finance.

Tex., **Sabinal**—AIRPORT—City, grading, ing, lighting airport. **$108,603.** CAA will lp finance.

Tex., **Salt Flat**—AIRPORT—City, grading, ing, lighting airport. **$337,548.** CAA will lp finance.

Tex., **San Angelo**—AIRPORT—City, grading, paving, lighting airport. **$141,801.** CAA ill help finance.

Tex., **San Angelo**—BROADCASTING STATION—K.G.K.L., Inc., San Angelo, frequency modulation radio broadcasting station. **$40,000.** Financing available.

Tex., **San Antonio** — AIRPORT — City, grading, paving, lighting airport. **$1,-** 56,267. CAA will help finance.

Tex., **San Antonio**—BROADCASTING STATION—Walmac Co., Station KMAC, National Bank Commerce Bldg., frequency modulation radio broadcasting station. **$0,000.** Financing available.

Tex., **San Antonio**—HANGAR—Union Bus nes, c/o J. Amberson, 107 Kayton St., 0x200 ft., rein.-con., hollow tile airport angar. **$60,000.** Financing available. Site urchased.

Tex., **San Benito**—AIRPORT—City, grading, paving, lighting airport. **$25,399.** CAA ill help finance.

Tex., **Sanderson**—AIRPORT—City, grading, paving airport. **$77,880.** CAA will help nance.

Tex., **San Diego**—AIRPORT—City, grading, paving, lighting airport. **$834,405.** AA will help finance.

Tex., **San Marcos**—AIRPORT—City, grading, paving, lighting airport. **$200,651.** CAA ill help finance.

Tex., **San Saba**—AIRPORT—City, grading, aving, lighting airport. **$169,290.** CAA will elp finance.

Tex., **Schulenberg**—AIRPORT—City, grading, paving, lighting airport. **$110,649.** CAA ill help finance.

Tex., **Seagraves**—AIRPORT—City, grading, paving, lighting airport. **$259,182.** CAA ill help finance.

Tex., **Sealy**—AIRPORT—City, grading, aving, lighting airport. **$73,133.** CAA will elp finance.

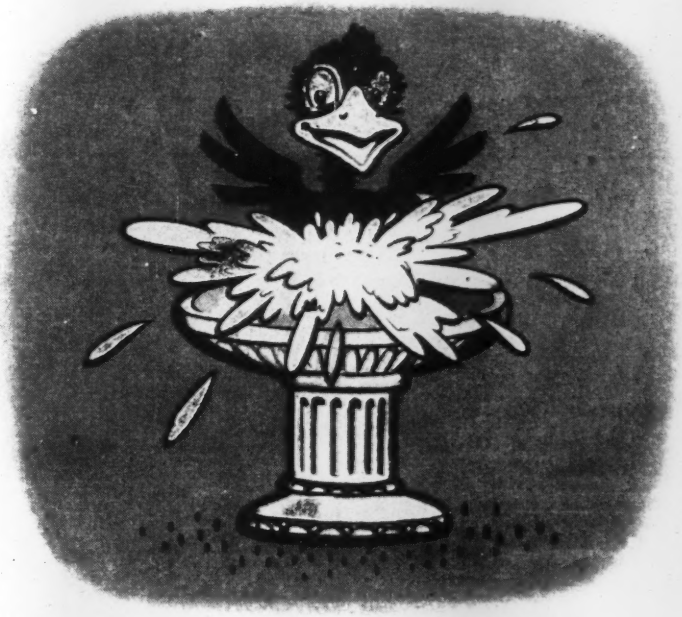
Tex., **Seguin**—AIRPORT—City, grading, paving, lighting airport. **$632,170.** CAA ill help finance.

Tex., **Seminole**—AIRPORT—City, grading, aving, lighting airport. **$255,433.** CAA will elp finance.

Tex., **Seymour**—AIRPORT—City, grading, aving, lighting airport. **$358,980.** CAA will elp finance.

Tex., **Shamrock**—AIRPORT—City, grading, paving, lighting airport. **$627,935.** AA will help finance.

Tex., **Sherman-Denison**—AIRPORT—Cities, rading, paving airport. **$140,140.** CAA will elp finance.



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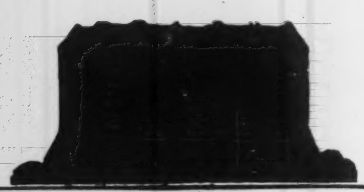

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POSTWAR PROJECTS (Cont'd.)

Tex., Sierra Blanca—AIRPORT—City, grading, paving, lighing airport. **$287,430.** CAA will help finance.

Tex., Silsbee—AIRPORT—City, grading, paving, lighting airport. **$116,270.** CAA will help finance.

Tex., Sinton—AIRPORT—City, grading, paving, lighting airport. **$114,940.** CAA will help finance.

★**Tex., Slaton**—AIRPORT—City, grading, paving, lighting airport. **$579,909.** CAA will help finance.

Tex., Smithville—AIRPORT—City, grading, paving, lighting airport. **$68,740.** CAA will help finance.

★**Tex., Snyder**—AIRPORT—City, grading, paving, lighting airport. **$557,326.** CAA will help finance.

Tex., Sonora—AIRPORT—City, grading, paving, lighting airport. **$141,801.** CAA will help finance.

Tex., Spearman—AIRPORT—City, grad, ing, paving, lighting airport. **$277,409.** CAA will help finance.

Tex., Spur—AIRPORT—City, grading, paving, lighting airport. **$179,179.** CAA will help finance.

Tex., Stamford—AIRPORT—City, grading, paving, lighting airport. **$428,065.** CAA will help finance.

Tex., Stanton—AIRPORT—City, grading, paving, lighting airport. **$303,809.** CAA will help finance.

★**Tex., Stephenville** — AIRPORT — City, grading, paving, lighting airport. **$860,-398.** CAA will help finance. CD 11/3—ENR 11/16.

Tex., Sterling City — AIRPORT — City, grading, paving, lighting airport. **$315,609.** CAA will help finance.

Tex., Stratford—AIRPORT—City, grading, paving, lighting airport. **$223,289.** CAA will help finance.

Tex., Sudan—AIRPORT—City, grading, paving, lighting airport. **$193,765.** CAA will help finance.

★**Tex., Sulphur Springs**—AIRPORT—City, grading, paving, lighting airport. **$627,-105.** CAA will help finance.

Tex., Sunray—AIRPORT—City, grading, paving, lighting airport. **$301,602.** CAA will help finance.

Tex., Sweetwater—AIRPORT—City, grading, paving, lighting airport. **$188,397.** CAA will help finance.

Tex., Tahoka—AIRPORT—City, grading, paving airport. **$236,540.** CAA will help finance.

★**Tex., Taylor**—AIRPORT—City, grading, paving, lighting airport. **$616,700.** CAA will help finance.

Tex., Teague—AIRPORT—City, grading, paving, lighting airport. **$87,845.** CAA will help finance.

Tex., Temple—AIRPORT—City, paving, lighting airport. **$31,900.** CAA will help finance.

Tex., Terlingua—AIRPORT—City, grading, paving, lighting airport. **$186,395.** CAA will help finance.

Tex., Terrell—AIRPORT—City, grading, paving, lighting airport. **$410,088.** CAA will help finance.

Tex., Texarkana—AIRPORT—City, grading, paving airport. **$122,870.** CAA will help finance.

★**Tex., Texas City**—AIRPORT—City, grading, paving, lighting airport. **$740,-034.** CAA will help finance. CD 5/5—ENR 5/18.

Tex., Texhoma—AIRPORT—City, grading, paving, lighting airport. **$291,115.** CAA will help finance.

Tex., Texon — AIRPORT — City, grading, paving lighting airport. **$190,355.** CAA will help finance.

Tex., Throckmorton — AIRPORT — City, grading, paving, airport. **$80,990.** CAA will help finance.

Tex., Tilden — AIRPORT — City, grading, paving, lighting airport. **$192,254.** CAA will help finance.

Tex., Tomball—AIRPORT—City, grading, paving, lighting airport. **$125,521.** CAA will help finance.

Tex., Tulia—AIRPORT—City, grading, paving, lighting airport. **$264,209.** CAA will help finance.

Tex., Tyler—AIRPORTS—City, grading, paving, lighting airport **$262,670,** grading, paving, lighting airport **$101,310.** CAA will help finance.

★**Tex., Uvalde**—AIRPORT—City, grading, paving, lighting airport. **$553,355.** CAA will help finance.

Tex., Van Horn—AIRPORT—City, grading, paving airport. **$67,925.** CAA will help finance.

Tex., Vernon—AIRPORT—City, grading, paving, lighting airport. **$366,410.** CAA will help finance.

Tex., Waco—AIRPORTS—City, grading, paving, lighting airport **$60,335,** paving airport **$57,420.** CAA will help finance.

Tex., Waco—BROA... Frontier Broadcasting ... quency modulation ... tion. **$40,000.** Financ...

Tex., Waco—BROA... —Industries, Inc., ... frequency modulation ... station. **$40,000.** Fi...

Tex., Waelder—AI... paving, lighting airpo... help finance. $79,080.

Tex., Weatherford—A... ing, paving, lighting ... CAA will help finance...

★**Tex., Wellington**—A... ing, paving, lighti... CAA will help finance...

Tex., West Columbia... grading, paving airpo... will help finance. $111,123.

★**Tex., Wharton**—A... ing, paving, lighti... CAA will help finance...

Wis., Ladysmith — A... E. W. Hill, clk., Lady... port Comr. to buy 116 ... Grant as site for airp... provided. CD 1/26—ENR ... $64,000.

Ont., Fergus—DAM... servation Comn., 24 Eg... dam construction. **$35,000.**

Ont., London—RAILWAY SIDING... Labatt, Ltd., Simcoe St., ... plant. About **$40,000.**

Que., Levis—RAILWAY LINE—Municipality, branch railway line, $75,000 plus.

PLANS UNDER WAY

★**Calif., Oakland**—PLAYGROUNDS... City, City Hall, Redwood Heights ... ground, **$90,000;** Roosevelt-Garfield ... Recreation center bldg. and ... **$265,000;** Brookfield Village playfield ... clubhouse, **$100,500;** Golden Gate Playground ... clubhouse, **$75,000;** Bayview Field ... and field house, **$32,000;** Lockwood ... clubhouse and playfield, $95,000; Bella ... playground and field house, $20,000; ... enclosed swimming pools, $600,000; ... dale School area playground and ... **$160,000;** New Century community ... lighting, **$16,500;** Montclair Recreation ... ter imprvs., **$35,000;** lighting Lincoln Playground, **$8,000;** Lakeside Park tennis ... **$7,500;** Fruitvale-Foothill Blvd. Park ... field and clubhouse, $100,000; lighting ... Clymonds Athletic field, $15,000; ... Gate Playground imprvs., lighting $15,... W. N. Frickstad, City Hall, city engr.

★**Ind., Fort Wayne**—ARENA, etc.—... O'Connor, c/o A. M. Strauss, archs., ... Cal-Wayne Bldg., plans under way arena, ... auditorium, Bluffton Rd. and Brooklyn Ave., between **$500,000-$750,000.**

★**Ind., Fort Wayne** — COLISEUM, ... City, City Hall, preliminary sketches ... A. Heeter, 1027 Elmwood St., memorial ... seum, combined educational and ... tional center, from Hanna St. east ... Anthony Blvd. **$1,000,000-$1,500,000,** Financing not provided.

New York—ELECTRICAL WORK, ... Dpt. Parks, Arsenal Bldg., Central Park ... St. and 5 Ave., New York, Zone 21, plans ... completed all electrical work (outside ... bldgs.) and sewage disposal sys. in Marine ... Park, Richmond Co. **$275,000.** Financing ... provided. E. A. Sears, 13 E. 37 St., ... York, Zone 16, consult. engr. CD 3/26-... ENR 4/1/43.

N. Y., Brooklyn—FIELD HOUSE, ... Dpt. Parks, Arsenal Bldg., Central Park ... St. and 5 Ave., New York, Zone 21, plans ... completed field house and boat house at ... Marine Park, Proj. P-77, **$140,000.** Financing ... not provided. H. A. Magoon, 225 E. 57 St., ... New York, Zone 17, archt. CD 10/20—ENR ... 11/2.

N. Y., Flushing—PARK IMPROVEMENTS ... —Dpt. Parks, Arsenal Bldg., Central Park, ... 64 St. and 5 Ave., New York, Zone 21, plans ... completed tide gate, pedestrian bridge, ... ing fountain, tool house, foot bridges ... in Alley Pond Park, P-83. Financing ... provided. Madigan-Hyland, ... Long Island City, consult. engr. CD 10/... ENR 11/16.

★**N. Y., Flushing**—PARK DEVELOPMENT ... —Dpt. Parks, Arsenal Bldg., Central ... Park, 64 St. and 5 Ave., New York, Zone ... completed constructing Kissena Park ... dor area bounded by Crommelin ... St., Peck Ave., Kissena Blvd., ... Elder Ave., Main St., ... P-87-A, **$375,000;** development Kissena Corridor area from Utopia Parkway to ... ham Park, Proj. P-87-B, $278,000. Financing not provided. C. C. Combs, 881 ... Ave., New York, Zone 22, landscape archt. CD 2/7—ENR 2/24.

N. Y., Hollis—COMFORT STATION—Dpt. ... Parks, Arsenal Bldg., Central Park, 64 St. ... and 5 Ave., New York, plans completed by ... Skidmore, Owings & Merrill, 5 E. 57 St., ... New York, Zone 22, comfort station, Proj. ... **$78,000.** Financing not provided.

N. Y., New York—COMFORT STATION, ... etc.—Dpt. Parks, Arsenal Bldg., Central ... Park, 64 St. and 5 Ave., Zone 21, plans completed by Aymar Embury II, 730 E. 61 St.,

STWAR PROJECTS (Cont'd.)

e 21, combined comfort station, ticket e and concession bldg. in southwest sec- of Battery Park, Proj. P-38. **$80,000.** ancing not provided. CD 4/8/43—ENR 5.43, under Public.

N. Y., New York—COMFORT STATION, —Dpt. Parks, Arsenal Bldg., Central rk, 64 St. and 5 Ave., Zone 21, plans mpleted comfort station, shelter and lunch- om, east of Range 1, Bronx Botanical rden. **$70,000.** Financing not provided. D. Clarke, 10 Rockefeller Plaza, Zone 20, nsult. engr. CD 3/26/43—ENR 4/1/43.

N. Y., New York—GAS STATIONS—Dpt. rks, Arsenal Bldg., Central Park, 64 St. d 5 Ave., Zone 21, plans completed by mar Embury II, 150 E. 61 St., Zone 21, gas stations on Hutchinson River Park- ay, Proj. P-92. **$104,625.** Financing not ovided. CD 4/8/43—ENR 4/15/43.

N. Y., New York — PARK DEVELOP- MENT—Dpt. Parks, Arsenal Bldg., Cen- al Park, 64 St. and 5 Ave., Zone 21, plans mpleted development of Hunter-Twin Is- nds and Turtle Cove area in Pelham Bay rk, Proj. P-91, Contr. X-39-343, general rk development **$833,500,** Contr. X-39-443, anting **$282,645.** W. Earle Andrews, 1 E. St., Zone 22, consult. engr.; 3 concessions d comfort stations, in Hunter and Twin Is- nd area, Pelham Bay Park, Proj. P-91, ntr. X-39-543, **$118,000.** Skidmore, Owings Merrill, 5 E. 57 St., New York, Zone 22, ht. Financing not provided. CD 3/26/43 ENR 4/1/43.

Okla., Cushing — AIRPORT — City, City all, plans 15% completed municipal air- rt. **$175,000.** Land rights not cleared, ancing not provided. Aviation Service . First National Bank Bldg., Oklahoma ty, consult. engr. CD 1/11—ENR 1/25.

Okla., Newkirk—AIRPORT—City, Mayor bright, City Hall, plans 5% completed air- rt. **$80,000.** Land rights not cleared, ancing not provided. J. S. Clark, Ponca ty, engr.

Okla., Okemah — AIRPORT — City, City all, plans 20% completed airport. **$140,000.** and rights not cleared, financing not pro- ded. Aviation Service Co., First National ank Bldg., Oklahoma City, consult. engr. D 1/12—ENR 2/8.

Okla., Sulphur — AIRPORT — City, City all, plans 10% completed municipal air- rt. **$115,000.** Land rights not cleared, ancing not provided. Aviation Service Co., rst National Bank Bldg., Oklahoma City, nsult. engr. CD 1/12—ENR 2/8.

Pa., Northampton — PARK, etc. — North- mpton Boro, Northampton, imprv. approx. acre tract as park with swimming pool, nnis courts, picnic areas, concert and rking facilities, etc. **$50,000-$75,000.** and rights not cleared. J. H. Immel, Mu- ipal Bldg., engr.

Pa., Phila. — PLAYGROUND EXPAN- SION PROGRAM—Bd. Educ., A. B. An- rson, supt., 21 and Parkway, plans 50% mpleted playground expansion program, oj. 41, **$57,500;** Proj. 42, **$57,500;** Proj. 43, 7,500; Proj. 44, **$57,500;** Proj. 45, **$57,500;** oj. 46, **$57,500;** Proj. 47, **$57,500;** Proj. 48, 7,500; Proj. 49, **$57,500;** Proj. 50, **$57,500;** oj. 51, **$57,500;** Proj. 52, **$57,500;** Proj. 53, 7,500; Proj. 54, **$57,500;** Proj. 55, **$57,500;** oj. 56, **$57,500;** Proj. 57, **$57,500.** Financing ot provided.

Tenn., Knoxville—PARKS, etc.—Knox Co., dge J. W. Elmore, Jr., Court House, ans completed parks, swimming pool, thhouse, other recreational facilities. 0,000. Financing not provided. W. C. cCammon, planning engr. Knox Co. anning Comn., Court House.

Tex., Dallas — PARK — City, City Hall, ans under way developing Buckner Park, d hardsurfaced tennis courts, night ghting, baseball diamonds, etc. **$40,000.** nancing available.

Tex., Dallas (Oak Cliff area) — PLAY- GROUND DEVELOPMENT—City, City Hall, playground development, Chalk Hill Rd. and ement plant. **$32,000.** Financing available. Hare & Hare, 114 W. 10 St., Kansas City, o., and c/o City Hall, Dallas, consult. engrs.

Tex., Paris—RECREATIONAL PARKS— ty, J. W. Barnes, mayor, City Hall, pur- hase and development 60 acre fair grounds, uditorium, Lake Gibbons. **$150,000.** W. F. Hicks, City Hall, city engr.

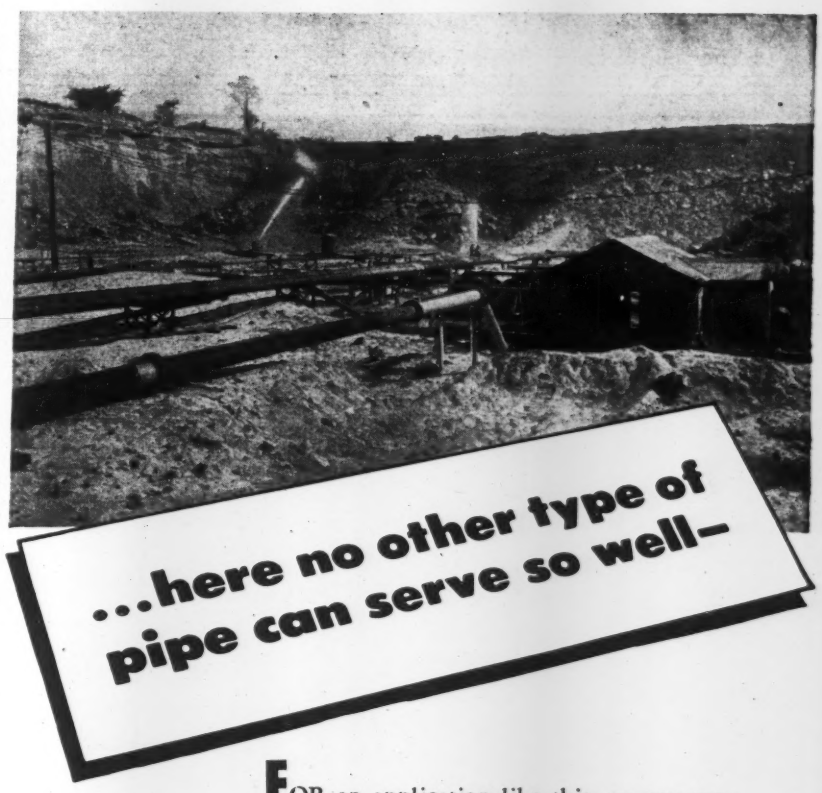
B. C., Vancouver—PIER CONSTRUCTION —Canadian Pacific Ry. Co., J. E. Armstrong, ief engr., Windsor Station, Montreal, Que., reconstructing Pier D. **$100,000.**

Ont., Fort William—ARENA—City, A. Mc- Naughton, clk., plans by H. M. Scott, 200 uthbertson Bldg., and L. Y. McIntosh, 118 Syndicate Ave., arena, Syndicate Ave. 350,000-$400,000.

Que., Quebec City—BEAUTIFICATION— Municipality, F. X. Chouinard, clk., Quebec ity beautification Henderson Square. **$250,-** 000. E. Hamel, City Hall, engr.

READY FOR BIDS

Conn., New Haven — PARK IMPROVE- MENTS — City, Dpt. Parks, City Hall, plans completed by R. W. Foote, 157 Church St., Beaver Park imprvs., incl. athletic field, field house, etc., 2 football and 1 baseball fields. 57,000. Financing provided. V. Barry, Hall of Records, engr. CD 1/16—ENR 1/18, under Unclassified.



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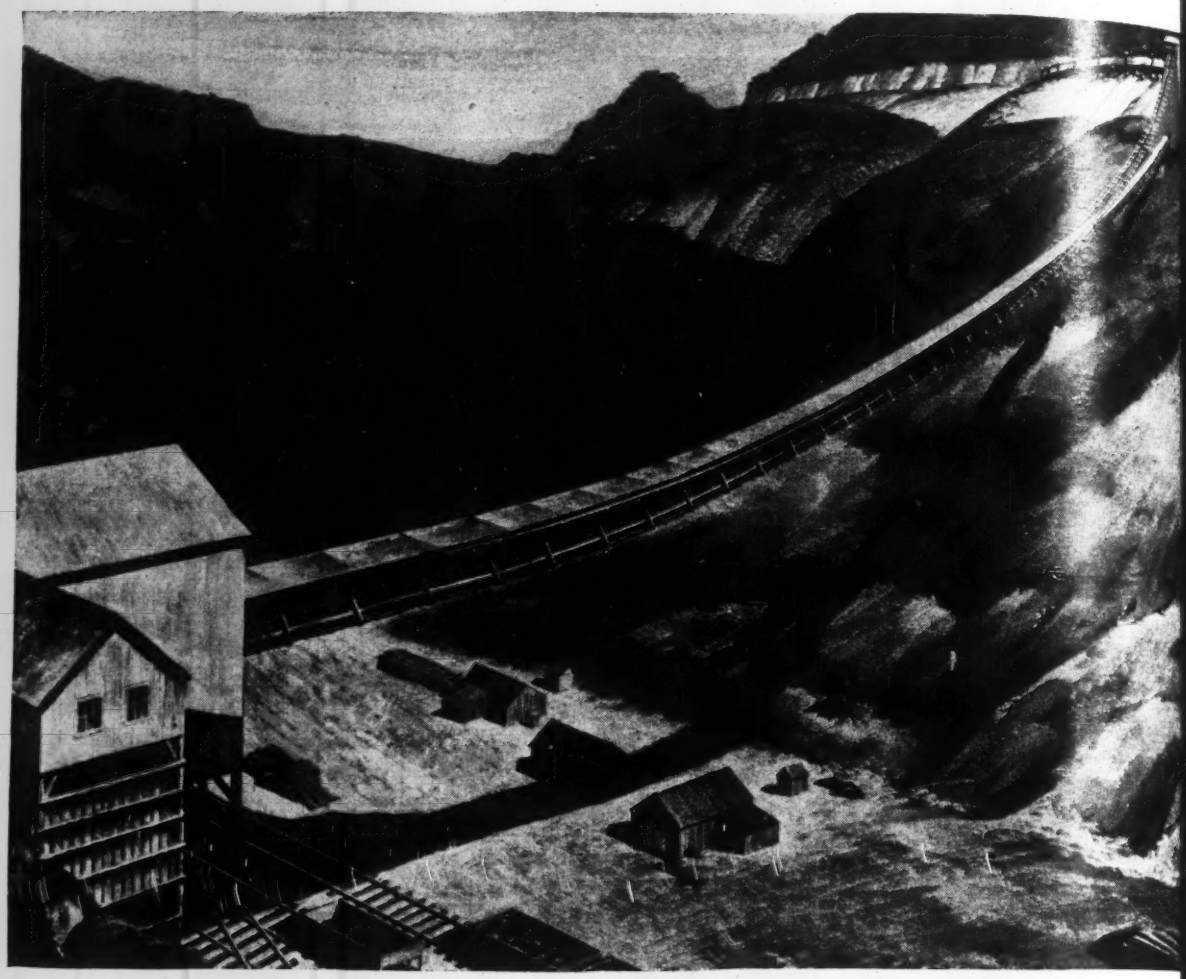

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WATER SUPPLY

PROPOSED WORK

Calif., Glendale—City, City Hall, 3½ m.g. reinf.-con. reservoir, $60,000. J. C. Albers, City Hall, engr. CD 7/17—ENR 7/20.

Me., Waterville—Kennebec Water Dist., Bd. Trustees, Waterville, revised plans completed and bids soon 26,000 ft. 16 in. pipeline and spl. pipe fittings, valves from Winslow to Passaloboro, Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., engrs. CD 12/12—ENR 12/14.

Mass., Rowley—Town Bd. Selectmen, Town Hall, water sys., storage and watermains. Over $15,000.

Mo., Pleasant Hill—City, J. H. Swift, Mayor, City Hall, purchased 238 acres land in Cass and Jackson Counties as site for 90 acre lake serving water supply, and installing gravity-flow pipeline from lake to pump and purification plant erected adjacent to municipal light and power plant, $135,000. J. H. Shikles & Co., Reliance Bldg., Kansas City, Mo., engrs.

O., Columbus—City WW Dpt., C. R. Hoover, supt., City Hall, water filtration plant pump, about 5 m.g. daily, on McCoy Rd., east of Route 33, serving North Side, $400,000. CD 8/10—ENR 8/17.

O., Toledo—City Waterworks Div., Cherry St., cement relining 10 mi. all 30 in. c.i. watermains. $200,000. O. Clark, city WW engr.

†Okla., Oklahoma City—C. F. Aurand, city engr., City Hall, water imprvs., addns., incl. filter plant and pump. station, Okla. 4-205. $186,000. **FWA.** V. V. Long & Co., 1300 Colcord Bldg., Zone 2, engrs.

†Tex., Gatesville—U. S. Eng., Fort Sam Houston, rehabilitation water pump. station, at Camp Hood, Ser. W-41-154-45-96. Over $15,000.

Tex., Pharr—City, A. A. Kelley, mayor, City Hall, bids soon water and sewer imprvs., incl. 2 filters and pumps addns., stationary engine, installing 10 or 12 in. main from pump. plant to by-pass city and connect with 8 in. line, enlarging present sewage disposal plant. A. Tamm, 107 S. 1 St., Harlingen, engr.

†Tex., Temple—A. E. Taylor, mgr., City Hall, water imprvs., Tex. 41-708. $144,007. **FWA.** J. Montgomery, Nolle Annex, Austin, engr.

†Tex., Waco—Geo. J. Rohan, supt. Water, Waco, water imprvs., Tex. 41-706. $186,000. **FWA.** J. J. Rady, Insurance Bldg., Fort Worth, engr.

BIDS ASKED

Bids Asked April 20

N. Y., Utica—Bd. Contr. & Supply, City Hall, 8,100 ft. 36 in. c.i. water supply mains. CD 12/28—ENR 1/4.

LOW BIDDERS

†Tex., Fort Worth—S. H. Bothwell, city engr., City Hall, Mar. 12, Contr. 5, install. equip. at Holly Plant, Tex., 41-641-N, from Lippert Bros., 2306 NW 23 St., Oklahoma City, Okla., **$141,685.** Est. $125,000. CD 3/1—ENR 3/8.

Que., Plessiville—Municipality, D. Michaud, clk., water reservoir, from LaSalle Paving Co., Victoriaville, **$29,685.** C. Lessard, 32 Blvd. des Allies, Quebec City, engr.

CONTRACTS AWARDED

Calif., Santa Ana—South Coast County Water Dist., c/o County Clerk, Santa Ana, imprv. water sys., reservoirs, etc., to American Pipe & Constr. Co., 4635 Firestone Blvd., South Gate. **$264,394.** Est. $285,000. Bids 3/9.

†N. C., Camp Le Jeune (New River, br. New Bern)—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., water plant and mains, Hadnot Point, NOY 11255, to Blythe Bros. Co., Harrison Wright Co., Camp LeJeune, **$185,689.** CD 3/15.

Pa., Essington—Westinghouse Elect. & Mfg. Co., H. H. Bates, works engr., Lester, Intake basin repairs, to Wharton Constr. Co., 4 and Chestnut Sts., Phila., **$135,000.** Awarded 3/7.

†Pa., Yorktown—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., water treatment facilities exten., Naval Mine Warfare School, NOY 10651, to Doyle & Russell, Central National Bank Bldg., Richmond, Va. **$38,365.**

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Name in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings
Unclassified

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only). For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

†Tex., Forth Worth—S. H. Bothwell, city mgr., City Hall, Contr. 5, Holly Pump. Plant imprvs., Tex. 41-641-N, to Glade Constr. Co., Century Bldg., **$142,200.** Est. $125,000. **FWA.** Bids 3/12, awarded 3/14. CD 3/1—ENR 3/8, under LB.

Wash. Yakima—Nob Hill Water Co., Yakima, well, to A. A. Durand & Son, Walla Walla, **$25,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Los Angeles—Los Angeles Co., Hall of Records, sanitary sewers in Quill Dr. and other streets in vicinity of Downey. $44,200.

Mass., Springfield—City Sewer Dist., City Hall., sewers in Oakwood Terrace, Aster, Goldenrod, Baywood, Arbutus and Bay Sts., $37,000.

O., Toledo—G. Schoonmaker, city mgr., Safety Bldg., City Hall, incinerator. $250,000-$300,000.

Tex., Dallas—City, City Hall, sanitary sewer lines in Vickery Community. $75,000.

†Tex., Houston—J. N. Edy, city mgr., City Hall, sewer imprvs., Tex. 41-712. $115,970. **FWA.** J. G. Turney, City Hall, dir. P. Wks. CD 11/27—ENR 11/30.

Va., Richmond—City, City Hall, storm sewers in west end of city, $114,000. G. M. Bowers, dir. Dpt. P. Wks.

†Wash., Sunnyside—City, City Hall, bids soon sewer exten., Wash. 45304-N. $15,000. **FWA.** G. D. Hall, Larson Bldg., Yakima, engr. CD 3/16.

N. B., Sussex—Municipality, sewer exten. in Queen St., etc. $25,000. A. Thorne, Town Hall, engr.

N. S., Halifax—Municipality and Dominion Govt., Halifax, drainage scheme at Fairview, $39,000. Dpt. Transport, Ottawa, Ont., and R. M. MacKinnon, City Hall, Halifax, engrs.

Ont., Chatham—Dover Twp., Chatham, sewerage sys. $50,000. W. G. McGeorge, Chatham, engr.

Ont., St. Catherines—City, H. H. Smith, clk., installing large intercepting trunk sewer and erecting pump. sta. to connect all sewer outlets within city limits, also constructing sewage disposal plant, northwest part of city. About $175,000.

BIDS ASKED

Bids Asked About May 1

†Wash., Sunnyside—City, City Hall, sewage disposal plant, Wash. 45304-N. $115,000. **FWA.** G. D. Hall, Larson Bldg., Yakima, engr. CD 3/16.

Bids Asked May 8

Calif., Los Angeles—Los Angeles Co., Hall of Records, 14,400 ft., 6 and 8 in. vitr. clay sanitary sewers in Lavinia Ave., et al. $47,600. A. Jones, Hall of Records, engr.

LOW BIDDERS

Tex., Houston—City, City Hall Mar. 15, storm sewers in Manchester St., from Bishop Brick Co., 2302 Jefferson St., **$89,742.**

Wis., Appleton—City, E. E. Sager, clk., City Hall, Mar. 16, laying storm sewers, from Chas. A. Green & Son, Inc., 123 S. Appleton St., **$30,897.** CD 3/6—ENR 3/8.

CONTRACTS AWARDED

†Calif., Port Chicago—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., procurement and erection 2 incinerators, Naval Magazine, NOY 12051, to Rees Blow Pipe Mfg. Co., 340 7 St., San Francisco, **$60,000.**

†Mo., St. Joseph—U. S. Eng., 10 E. 17 St., Kansas City, Mo. sewage pump. plant at Rosecrans Airfield, to Feeney Constr. Co., 7 and Olive Sts., **$27,752.**

BRIDGES

PROPOSED WORK

★**†Md., Chesapeake City**—U. S. Eng., Penn Mutual Bldg., Phila., Pa., bids soon rebuilding high level vertical lift steel, concrete highway bridge over Chesapeake & Delaware Canal. $2,000,000. Parsons, Klapp, Brinkerhoff & Douglas, 142 Maiden Lane, New York 7, N. Y., engrs.

O., Youngstown—Mahoning Co., Court House, plans Racoon Rd. Bridge, Canfield Twp., and Seacrist Rd. Bridge, Goshen Twp., $29,500; Lake Park Blvd. Bridge, Smith Twp., $41,900; maintenance and replacement bridges Division, McGuffey, Center, Market and Bridge Sts., McCartney, Hubbard, Canfield and Roller Rds., Canfield-Palmyra and Snodes-New Middletown, $24,550. S. Gould, Jr., Court House, engr.

N. S., Halifax—Municipality and Dominion Govt., Halifax, overhead bridge, culvert and traffic circle with approaches, $378,000. Dpt. Transport, Ottawa, Ont., and R. M. MacKinnon, City Hall, Halifax, engrs.

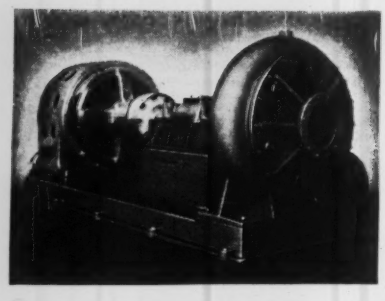
Que., Rimouski—Province of Quebec, Quebec City, reconstructing bridge over River Rimouski. $35,000. Dpt. P. Wks., Quebec City, engr.

BIDS ASKED

Bids Asked March 27

Pennsylvania—At office J. U. Shroyer, secy. Hys., Harrisburg, repairing bridge over Allegheny River at West Hickory, Route Legislative R-598 Traffic R-127, Harmony and Hickory Twps., Forest Co.

This MORRIS
HYDRAULIC CUTTER DREDGE
has proved its worth on
3 different deposits*
in 3 different locations...



Assembled, dismantled and moved overland 3 different times—for dredging jobs on 3 difficult deposits—the *Captain George*, a Morris 12″ portable hydraulic cutter dredge has proved both its versatility and its mobility . . . demonstrating again that Morris dredges are engineered with two ends in view:—

1. MAXIMUM OUTPUT through getting the maximum amount of solids into the pump at a uniform rate.

2. MAXIMUM LIFE with a reasonable and economical wear of all parts.

Both require an efficient and correctly designed cutter operating at a proper speed, a properly laid out suction pipe arrangement, and an efficient dredge hoist that is simple in operation and capable of operating the cutter ladder and swinging the dredge quickly and accurately. The *Captain George* is an outstanding example of just such an efficient and well-balanced machine.

* 1. (near Chicago) production of heavy sand and gravel, delivering through approximately 1500′ of 12″ discharge line against a 30′ static discharge head. Used until deposit was exhausted.

2. (Mississippi River) dredging for locks and dams. Used until work was completed.

3. (Albert Lea, Minn.) A lake improvement project, moving 500,000 cu. yds. of mud, clay, sand and gravel through 12″ discharge lines up to 3500′ in length. Used for 7 months.

4. (Portland, Ore.) Now being set up for its fourth job.

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MORRIS CENTRIFUGAL PUMPS

BRIDGES (Bids Asked, [illegible]

Bids Asked [illegible]

Louisiana—Dpt. Hys [illegible] rein.-con. box culverts [illegible] Ave. and Buckner Dr[illegible] Govt. St. Extension Hy[illegible] East Baton Rouge Pa[illegible] $1.50.

Bids Asked [illegible]

Wis., Prairie du Chien [illegible] Comn., double 30 ft. [illegible] timber Garvey Bridge [illegible] Proj. B 826. C. Ande[illegible]

Bids Asked [illegible]

Florida—State Road D[illegible] chn., Talahassee, repl[illegible] Hathaway and DuPont [illegible] Job. No. 4602-902, Bay [illegible] rein.-con. bridge on tr[illegible] and rein.-con. box culv[illegible] Job. No. 6007-103, Walto[illegible]

Bids Asked [illegible]

Pennsylvania and New [illegible]**ersey**—Delaware River Joint Comn., [illegible] mgr., Camden Plaza, Cam[illegible] ing Delaware River Brid[illegible]

Bids Asked [illegible]

Ont., Cookstown — T[illegible] Robinson, clk., Cookstow[illegible] 36 ft. span, rigid frame [illegible] Eagleson, Orangeville, en[illegible]

Bids Asked [illegible]

Washington — State [illegible] Hickey,, dir., Olympia, [illegible] surfacing, 6 concrete bridges [illegible] Hy. 1, Austin Pass Branch [illegible] Baker, Whatcom Co., reconstructing [illegible] Fosdick cradle of Tacoma Ferry Sys[illegible] Primary State Hy. [illegible] Plans deposit $2; grading, [illegible] facing, removing 2 bridges [illegible] Secondary state Hy. 1-A, [illegible] vision, Whatcom Co., Plans deposit $2.

Bids Asked [illegible]

Mo., Kansas City—K. K. Kuk, dir. [illegible] Wks., City Hall, recondi[illegible]tioning 27 St. Trafficway Viaduct. [illegible] Plans deposit $25. Howard, Needles, Tam[illegible] men & Bergendoff, 1012 Baltimore St., engrs. R. McKinley, City Hall, City engr. adv. ENR 3/22.

CONTRACTS AWARDED

★**Pa., Wilkes-Barre**—Bd. Comrs. Luzerne Co., reconstructing Plymouth-Breaker bridge over Susquehanna River to C. F. Goeringer Constr. Co., 55 South Washington St., **$573,339.** CD—3/8—ENR 3/17 [illegible]der LB.

STREETS AND ROADS

BIDS ASKED

Bids Asked March [illegible]

Maryland—State Roads Comm., E. B. Wh[illegible]man, chn., Baltimore, applying [illegible] bituminous material for road surface treating hys. Dist. 1, Contr. ED-21-211, Dorchester, Worcester, Wicomico and Somerset Counties; 544,750 gal. for hys. Dist. 2, Contr. ED-211, Talbot, Caroline, Queen Annes, Kent and Cecil Counties; 522,955 gal. for hys. Dist. 3, Contr. ED-21-311, Anne Arundel, Carroll, Howard and Montgomery Counties; 232,835 gal. for hys. Dist. 4, Contr. ED-21-411, Baltimore and Harford Counties; 1,379,035 gal. for hys. Dist. 5, Contr. ED-21-511, Calvert, Charles, St. Mary's and Prince George Counties; 490,561 gal. for Dist. 6, Contr. ED-21-611, Allegany, Garrett, Frederick and Washington Counties.

Bids Asked March 29

★**Florida**—State Road Dpt., F. E. Bayliss, chn., Tallahassee, sand bituminous retread surface course paving approx. [illegible] Rd. 2, between Winter Haven and Haines City, S. P. Job 1614-102, $45,600; bituminous retreating 17.354 mi. Rd. 2, between Bartow and Bowling Green, S.P. Job No. 1603-902, $35,000; bituminous retread surface course 3.98 mi. Rd. 140, S.P. Job 7303-104, Frazier Co., $35,000; 8.017 mi. Rd. 61, Auburndale, S.P. Job No. 1616-103, Rd. 79, Lake Wales, Job No. 1613-106, Rd. 79, Mulberry and Lake Wales, Job 1611-105, Rd. 8, sects. in Frostproof and Lake Wales, Job 1609-111, Rd. 18, sects. in and near Haines City, Job 1605-107, $70,000, all foregoing in Polk Co.; 4.025 mi. Rd. 13, between Santa Fe River and [illegible] approx. 4.035 mi. north, S.P. Job No. 2405-109, Bradford Co. $25,000; widening curves, bituminous retread surfacing 1.924 mi. Rd. 2, S.P. Jobs Nos. 2903-104 and 2904-103, Columbia Co., $35,000; 1.1751 mi. Rd. 3, Jacksonville, S.P. Job No. 7205-108, 5.002 mi. Rd. 138, Job 7215-102, Duval Co., $75,000; reworking and widening existing lime rock base, bituminous retread surface course 12.52 mi. Rd. 5, S.P. Job 2607-108, Alachua Co. $110,000; bituminous surface treating 6.3 mi. Rd. 159, S.P. Job 5311-104, Rd. [illegible] 8.527 mi. Job 545-104, Rd. 42, Jackson Co. $45,000; 6.834 mi. Rd. 194, S.P. Job 9314-901, Palm Beach Co., $25,000; 1.565 mi. Rd. 161, S.P. Job 9313-107, Palm Beach Co., $30,000; 4.2 mi. S.P. Jobs 7002-111, 7002-901 and 7003-105, Brevard Co., $45,000; 5.2 mi. Rd. 21, S.P. Job 1111-902, Lake Co., $60,000; reworking, widening existing lime rock base, bituminous retread surfacing 5 mi. Rd. 29, S.P. Job 9206-107, Osceola Co. and mineral seal coat surfacing 5 mi. Rd. 29, Job 9207-

STREETS AND ROADS (Bids Asked, Cont'd.)

...e, Okeechobee Co., $75,000; bituminous ...face treating approx. 12.89 mi. Rd. 24, ...P. Job 7005-901, reworking, widening existing lime rock base, bituminous surface ...eating 0.818 mi. Rd. 24, Job 7005-107 and ...uminous retread surface course approx. ...0 mi. Rd. 4, Job 7001-103, all in Brevard ..., $95,000; bituminous retread surface ...rse surfacing approx. 0.24 mi. Rd. 3, S.P. ...b No. 7701-107, sand seal coat surfacing ...prox. 3.212 mi. Rd. 44, Job 7704-902, ...uminous retread surface course surfacing ...prox. 1 mi. Rd. 57, Job 7705-105, all in ...minole Co., $15,000; clearing, grubbing, ...ading, etc. approx. 8.467 mi. Rd. 175, S.P. ...b No. 5900-103, Wakulla Co., $75,000; ...abilizing shoulders 1.281 mi. Rd. 4, S.P. ...b No. 9304-902, Palm Beach Co., and ...abilizing shoulders, bituminous mineral seal ...at surfacing approx. 5.313 mi. Rd. 4, State ...b 8901-903, Martin Co., $25,000; sand seal ...at surfacing approx. 7.041 mi. Rd. 140, ...P. Job No. 9404-901, approx. 13.882 mi. Rd. ...e Job 941-901, both St. Lucie Co., and ...355 mi. Rd. 140, Job 8903-902, Martin ..., $25,000; reworking existing base, bitu...inous retread surface course approx. 4.115 ...l. Rd. 4-A, S.P. Job 9001-103, Monroe Co., ...0,000; sand bituminous road mix pave...ent, etc., approx. 2.387 mi. Rd. 452, S.P. ...b 3006-102, Dixie Co., $35,000; bituminous ...ineral seal coat surfacing approx. 6.648 mi. ...d. 39, S.P. Job 6104-901, Washington Co., ...pprox. 2.581 mi. Rd. 500, Job 4701-901, Cal...oun Co., 2.419 mi. Rd. 500, Job 4605-901, ...ay Co., bituminous retread surfacing 2.377 ...i. Rd. 123, Job 5307-107, Jackson Co., sand ...ay base bituminous ssurface treated pave...ent approx. 2.5 mi. Rd. 20, Job 5303-107, ...ackson Co., bituminous retread surface ...urse approx. 0.746 mi. Rd. 1, Job 5301-104, ...pprox. 0.435 mi. Rd. 90, Job 5311-103, sand...ay base bituminous surface treating approx. ...25 mi. Rd. 90, Job 5309-106, foregoing Jack...on Co., $115,000; bituminous mineral seal ...oat resurfacing approx. 20.817 mi. Rd. 14, ...P. Jobs Nos. 2607-901 and 3101-201, Alachua ...d Gilchrist Counties, $30,000; bituminous ...tread surface course paving approx. 4.871 ...i. Rds. 5 and 27, S.P. Job No. 1201-112, Rd. ..., Job No. 1202-105, Rd. 25, Job No. 1204-104, foregoing Lee Co., bituminous surface treat...ng approx. 16.53 mi. Rd. 67, Job. No. 0501-..., Glades Co., approx. 3.7 mi. Rd. 25, Job ...o. 0701-903, Hendry Co., $115,000; 6 in. lime ...ck base surface treated paving, drainage ...tructures 2.033 mi. Rd. 259, Job 7114-301, ...cess Road Project DA-NC-44-A(1), Clay ..., $45,000; reworking and 2 in. intermediate ...pe surface pavement resurfacing 1.495 mi ...d 622, Job 1624-301, Access Rd. DA-NI-45-...(1), Polk Co., $25,000. J. H. Dowling, state ...y. engr.

Bids Asked March 27

Virginia—Dpt. Hys., Richmond, concrete ...ickening 12.52 mi. Route 17, S.P. S-156-AWI, ...WI, Gloucester Co.; 2.2 mi. Routes 22 and ...22, S.P. S-109-W2, Louisa Co.

Bids Asked March 28

Louisiana—Dpt. Hys., Baton Rouge, sand clay gravel surface course 16.131 mi. S.P. 16-01-05, Defense Access Army Reservation Proj. No. DA-WR-25 (1), State Route ... Vernon Parish; application bituminous surface treatment 15.8 mi. S.P. 30-04-07 Tangipahoa-Mississippi State Line Hy. State Route 7 and C-1775, Washington Parish.

Bids Asked March 29

Kansas—State Hy. Dpt., Winfield, grading ...283 mi. Proj. 18 WE R 5; grading, 0.162 ...i. substructure Gruda Springs Bridge, con...inuous steel beam spans, Proj. 18WE R6; ...rading 0.264 mi. Proj. 18WER 7; construct...ng substructure Dinckard Mill Bridge, 50-...00-100-50 ft. continuous beam spans, Proj. ...8-WE R 7, all foregoing in Cowley Co.; ...rading, light type surfacing 0.435 mi. Proj. ...WER 10, Sumner Co. R. C. Keeling, To...eka, engr.

Bids Asked March 29

New Mexico—At office F. G. Healy, state ...y. engr., Santa Fe, surfacing, oiling approx. ...165 mi. Hy. Route 54, F. A. Proj. 194-A(1), ...Torrance and Guadalupe Counties; oil ...reated top course surfacing 8.778 mi. Hy. ...Route 54, FAP 194-B(1), Lincoln Co.; 9.981 ...i. Hy. Route 17, F.A.P. 198-A(1), San ...Juan Co.

Bids Asked April 2

Pa., Marcus Hook—Marcus Hook Boro, ...R. C. Rennie, secy., Boro Hall, street re...paving, curbing, removing trolley rails and ...ties, $35,000. C. F. Boker, 605 Crozer Bldg., Chester, boro engr.

Bids Asked April 4

Louisiana—State Hy. Dpt., Baton Rouge, ...rading, surfacing 0.92 mi. S.P. 817-16-14-...opex Levee Set-Back exten. Hy. State ...Route C-1478, East Baton Rouge Parish; ...bituminous surface treatment on sand clay ...ravel base, etc., 1.741 mi. S.P. 13-09-14-...15-10-13. F.A.P. SN-FAP-128-A (3) and ...SN-FAP-76A (2), Breckwoldt and Goodbee ...Relocations, State Route 7, Tangipahoa and ...St. Tammany Parishes.

Bids Asked April 4

Pa., Phila.—City, J. H. Neeson, P. Wks. ...Dir., City Hall Annex, concrete paving, re...pairing pavements, etc., in city parks and ...squares for 1945. Approx. $40,000.

Bids Asked April 5

Ia., Emmetsburg—Bd. Supervs. Palo Alto County, grading 27 mi. various secondary roads, involving 157,000 cu. yd. cast grading 137,000 cu. yd. Class 2 end haul grading. Over $25,000. T. R. Martin, Emmetsburg, co. engr.

Bids Asked April 5

Ontario—D. J. Miller, Dpt. Hys., Toronto, surface treatment 32 mi. in New Liskeard. V. H. Longstaffe, New Liskeard, engr.

Ontario—J. D. Miller, Dpt. Hys., Toronto, surface treatment 59 mi. in Stratford; surface treating 20 mi. and prime dust laying 56 mi. in Chatham.

Bids Asked April 7

Ga., Columbus—City, City Hall, paving 3,920 sq. yd. 6 in. concrete, 400 yd. contract drive 6 in., 102 yd. 4 in. concrete walks, 26,655 lin. ft. concrete curb and gutter and miscellaneous quantities 12- to 15-in. terra cotta or concrete pipe.

Bids Asked April 24

Miss., Greenville—Mayor and City Council, City Hall, drainage, excav., storm sewers, combination curbing, guttering, parkway curbing, concrete paving sections certain streets. G. F. Archer, city clk. J. B. Williams, Yazoo City, consult. engr.

LOW BIDDERS

D. C., Wash.—District Comrs., District Bldg., Mar. 16, imprv. roadways of various streets, 2,700 tons bituminous surfacing, etc., from Wilmoth Paving Co., 60 P St. S.E. **$109,718.** CD 3/12.

Louisiana—State Hy. Dpt., Baton Rouge, Mar. 14, imprv. 19.2 mi. Rapides Parish, from E. A. Caldwell, Reymond Bldg., Baton Rouge, **$27,821***38.18 mi. Vernon Parish, from Barber Bros. Contg. Co., Reymond Bldg., Baton Rouge, **$41,158***1.756 mi. Plaquemines Parish, from Pierson Constr. Co., La. Natl. Bank Bldg., Baton Rouge, **$35,326.** CD 2/27—ENR 3/1.

Tex., Houston—City, M. H. Westerman, secy., City Hall, rein.-con. paving Manchester St., from Gaylord Constr. Co., 806 Blodget St. **$81,290.**

CONTRACTS AWARDED

Arkansas—State Hy. Dpt., Little Rock, bituminous surfacing 5.99 mi. and 3 treated timber, concrete bridges Naval Ordnance Plant area, Ouachita Co., to D. F. Jones Constr. Co., Insurance Bldg., Little Rock, **$160,671**; constructing 8.25 mi. on Oualaska connection, Ouachita Co., to Pioneer Constr. Co., Malvern, **$26,754.** Bids 3/12. CD 3/5.

Pa., Marcus Hook—Marcus Hook Boro, R. C. Rennie, secy., sidewalks, curbs, repairs, to Thomas A. Reilly Co., 12 Reaney St., Chester, **$30,000.** Awarded 3/10. F. Baker, 605 Crozer Bldg., Chester, boro engr.

Pa., West Chester—West Chester Boro, J. S. Groff, secy., Boro Hall, road repairs, imprvs., own forces. **$30,000.** T. Coleswortby, Court House, engr.

Tex., San Antonio—City, City Hall, asphalt paving and imprvs. streets, force account. **$346,000.**

★**Virginia**—State Hy. Dpt., Richmond, imprv. 1.59 mi. Albemarle Co., to Lane Constr. Corp., 35 Colony St., Meriden, Conn. **$519,517.** Bids 3/8. CD 3/13—ENR 3/15, under LB.

Ont., Chatham—Dover Twp., Chatham, road reconstruction day labor, **$45,000.** W. G. McGeorge, Chatham, engr.

Ont., Florence—Dawn Twp., Florence, road reconstruction, day labor, **$25,000.** S. Sinclair, R. R. 3, Florence, engr.

Ont., Kirkland Lake—Teck Twp., Kirkland Lake, grading, paving, lay labor, **$37,000.** F. A. Browne, Kirkland Lake, engr.

Ont., Westboro—Nepean Twp., Westboro, road reconstruction, repairs, day labor, **$70,000.** J. J. Tierney, 358 Roosevelt Ave., Westboro, supt. engr.

EARTHWORK, WATERWAYS

PROPOSED WORK

Md., Baltimore—Canton R. R. Co., W. T. Brooks, ch. engr., 300 Water St., Zone 2, soon lets contract, reconstruction bulkhead at Pier 6.

N. B., Chatham—Dominion Govt., Ottawa, Ont., dredging Miramichi River and placing lighted buoys on river, $60,000. Dpt. Transport, Ottawa, Ont., engr.

BIDS ASKED

Bids Asked March 30

†**Idaho, Coeur d'Alene**—Bureau Reclamation, Dpt. Interior, H. W. Bashore, comr., Coeur d'Alene, earthwork, concrete lining, pipelines, structures, canal and lateral sys., Post Falls unit, Rathdrum Prairie Proj., near here, Spec. 1094. Extended date. CD 3/6—ENR 3/8.

LOW BIDDERS

†**Md., Baltimore**—U. S. Eng., 21 St. and Constitution Ave. N.W., Wash. 25, D. C., dredging channel, near here, from Norfolk Dredging Co., Campotella Wharf, Norfolk, Va., **$27,300.** Est. $25,000.

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Awarded, (cont'd.)

CONTRACTS AWARDED

†Illinois—U. S. Eng., ... and Custom House, ... Louis 1, Mo., 300-600 ... protection and 400-700 ... on Illinois bank of Miss... Chain of Rocks Bridge... 23-065-45-95, to Hough... N. 14 St., St. Louis 3, Mo. ... 866, ...

N. J., Ocean City — ... City, 4 stone jetties ... beaches, to R. B. Jagga... Westmont, **$157,006.** B... ENR 2/15.

LATIN AMERICA

Argentina—Republic of ... Aires, recieving bids ... in **Entre Rios**, est. $6,000... est. $9,000,000. Nation... Buenos Aires, engrs.

Brazil, Maranhao—M... Ltd., Maranhao, plans ... $350,000.

Brazil, Rio de Janiero—... Rio de Janeiro, plans st... of railways, $1,000,000 plus. National Eco... nomic and Trade Council of Brazil, Rio de Janeiro, engr.

Colombia, Bogota—Caja de la Vivienda Popular, Bogota, plans 50 dwellings, $250,000.

Mexico—Pedro Martinez Tornel, secy. P... Wks., Tacuba St., Mexico City, plans ir... gation projects in Coahuila and Durango States. Est. $1,000,000 each state.

Mexico—Pedro Martinez Tornel, secy. P... Wks., Tacuba St., Mexico City, will con... struct road through cities of Zapotlanejo, Tototan, Atotonilco el Alto, Ayo el Chico and Degollado in state of Jalisco, by day labor. **$600,000.**

Mexico, Mexico City—Central Traffic Dept., Federal Dist., Mayor Rojo Gomez, Mexico City, plans ... parking ... $6,000,000.

Mexico, Tlalnepantla—State of Mexico and Federal District, Rojo Gomez, Mexico City, mayor of Federal District, takes bids hospital. $300,000. CD 2/15—ENR 2/1...

Panama, Penonome—Republic of Panama, Panama City, plans school, $2...

Panama, Panama City—... de Seguro Social, Panama City, plans 4 story re... con., apartment house containing 140 ... $700,000.

Panama, Penonome—Republic of Panama, c/o Controller-General, Panama City, plans school, $212,565.

Peru, Callao—Republic of Peru, Lima, plans wharf, $150,000. Dpt. Works, Lima, engr.

Peru, Huallanca—Chimbote ... Railway, Huallanca, completed surveys ... m. ... extension to Huaraz. Over $2,000,000.

Panama, Ocu—Republic of Panama, Panama City, plans schools. $...

B. W. I., Kingston—Municipality, plans sewerage sys. addns. $100,000.

B. W. I., Kingston—Municipality, plans reclamation swamp lands east and west of city, $125,000; imprv. gully courses by paving same and constructing retaining walls, $60,000.

B. W. I., Kingston—Municipality, plans exten., imprv. markets incl. erecting addl. steel sheds, refrigeration plant, etc. $...000; additional subsidiary fire brigade stations to east and west of city $100,000.

B. W. I., Kingston—Municipality, will reconstruct South Camp and Spanish Town Rds., by day labor. **$80,000.**

B. W. I., Kingston—Jamaica Govt., Kingston, plans agricultural training centre, $250,000. Dpt. Works, Kingston, Jamaica, engr.

B. W. I., Montega Bay—Jamaica Govt., Kingston, plans agriculture training centre, $200,000. Dpt. Works, Kingston, Jamaica, archts.

B. W. I., Port Antonio—Jamaica Govt., Kingston, Jamaica, plans agricultural training center. $150,000. Dpt. Works, Kingston, archt.

B. W. I., Spanish Town—Jamaica Govt., Kingston, Jamaica, plans agricultural training centre. $150,000. Dpt. Works, Kingston, Jamaica, archt.

PUBLIC BUILDINGS

PROPOSED WORK

★**Ala., Mobile**—City, City Hall, plans by C. Van Antwerp, 216½ S. Francis St., bids soon hospital addn. $500,000.

†Ariz., Phoenix—Pub. ... Housing Auth., NHA, Phelan Bldg., 760 Market St., San Francisco, Calif., 8 family stopgaps, Ariz. 2378.

†Ark., Pine Bluff—Pub. ... Housing Auth., NHA, 1411 Electric Bldg., ... and Lamar Sts., Fort Worth, Zone 2, Tex., ... family units, Ark. 3144.

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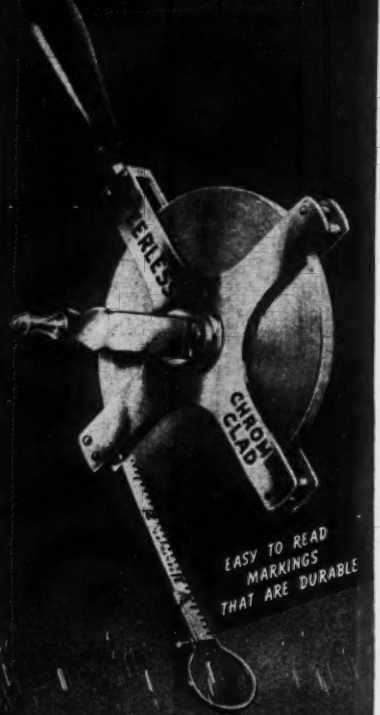

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

Calif., Concord — Concord Elementary School Dist., Concord, plans by Dragon & Schmidts, 2068 Allston Way, Berkeley, 1 story, 19 classroom bldg., kindergarten room, all-service room (50x80 ft), and office space, $229,000.

†Calif., El Centro—Pub. Housing Auth., NHA, Phelan Bldg., 760 Market St., San Francisco, 72 family stopgap units, Calif. 4048.

†Calif., El Centro—Pub. Housing Auth., NHA, Phelan Bldg., 760 Market St., San Francisco, 72 family stopgap units, Calif. 4059.

†Calif., Fairfield — Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by T. F. Pfleuger, 580 Market St., San Francisco, 156 temporary family dwelling units, Calif. 4983-N.

†Calif., Fontana — Pub. Housing Auth., NHA, 760 Market St., San Francisco, 200 family dwelling units, Calif. 4067.

†Calif., Los Angeles — Federal Works Agency, 2233 Fulton St., Berkeley, 13-classroom emergency type school. $78,000. **FWA.**

†Calif., Oxnard—Federal Works Agency, 1208 Santee St., Los Angeles, rejected bids Feb. 5, 16 classroom and administration unit school, Calif. 4-653-F. CD 2/5—ENR 2/8, under LB.

†Calif., Palm Springs—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by G. Stanley Wilson, 3691 6 St., Riverside, 25 temporary dwelling units, Calif. 4985.

†Calif., Pleasanton—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by W. D. Peugh & Associates, 333 Montgomery St., San Francisco, 188 temporary family dwelling units, Calif. 4988-N.

†Calif., Port Chicago—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Anshen, Reynolds, Chamberlain & Narbett, 5365 Bway., Oakland, 216 temporary family dwelling units, Calif. 4020-N.

†Calif., San Diego—Federal Works Agency, 2233 Fulton St., Berkeley, detached 4-classroom addn. to Oceanside Elementary School, for San Diego Unified School Dist. $39,500. **FWA.**

†Calif., San Bruno—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by L. J. Sharps, E. R. MacDonald and A. C. Williams, Phelan Bldg., San Francisco, 152 unit family housing, Calif. 4033 N. CD 2/20—ENR 3/1.

†Calif., San Francisco—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by W. P. Day, J. Funk & D. P. Smith, 58 Sutter St., 384 temporary family dwelling units, Calif. 4024-N. CD 2/19—ENR 3/1.

†Calif., San Francisco—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Hyman, Appleton, Wolford & D. P. Smith, 58 Sutter St., 144 temporary family dwelling units, Calif. 4030-N.

†Calif., Stockton — Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Peterson & Spackman, 604 Mission St., San Francisco, 36 temporary family dwelling units, Calif. 4024-N. CD 2/16—ENR 2/22.

†Calif., Stockton — Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Ernst & Cloudsley, 309 Exchange Bldg., 150 dormitory units, Calif. 4036. CD 2/20—ENR 3/1.

Calif., Ventura—Ventura Co., Court House, Ventura, plans by R. C. Wilson, P. O. Box 951, Santa Paula, 2 story, bsmnt., rein.-con. hospital addn. $150,000.

Calif., Walnut Creek—Walnut Creek Grammer School Dist., Walnut Creek, plans by Dragon & Schmidts, 2068 Allston Way, Berkeley, 12 classroom, rein.-con., school addn. $162,000.

†Colo., Grand Junction—Veteran's Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., 150-bed hospital.

★**†Fla., Daytona Beach**—U. S. Eng., Post Office Bldg., Savannah, Ga., bldg. expansion through new construction, conversion and increased maintenance for 3,500 convalescent patients at Welch Convalescent Center. $1,900,000.

†Ga., Blakely—Union School Dist., Blakely, 1 story, elementary and high school. $225,918. **FWA.**

†Ga., Jefferson—Bd. Educ., Jefferson, 1 story, part bsmnt., elementary and high school. $218,570. **FWA.**

★**†Ind., Camp Atterbury**—U. S. Eng., 612 Federal Bldg., Louisville, Ky., new bldgs., converting bldgs., etc. for 6,000 convalescents, at Wakeman General Hospital, $1,483,293. CD 3/13—ENR 3/15.

★**†La., McCoy**—Cabot Carbon Co., 77 Franklin St., Boston, Mass., carbon black plant. $1,040,000. Defense Plant Corp. will finance.

†Mich., Detroit—Murchey Machine & Tool Co., 951 Porter St., plant bldg., $375,000. Defense Plant Corp. will finance.

Mich., Northville — Northville-Plymouth General Hospital, Northville, plans by Bennett & Straight, 201 Schaefer Rd., Dearborn, 50 bed, brick, steel, stone and concrete hospital. $150,000.

†Mo., St. Louis—National Carbon Co., 4417 Oleatha Ave., Zone 16, plant addn. for production of battery cells for portable radios. $200,000. Defense Plant Corp. will finance.

Mo., Springfield—City, City Hall, 40-bed hospital. $160,000.

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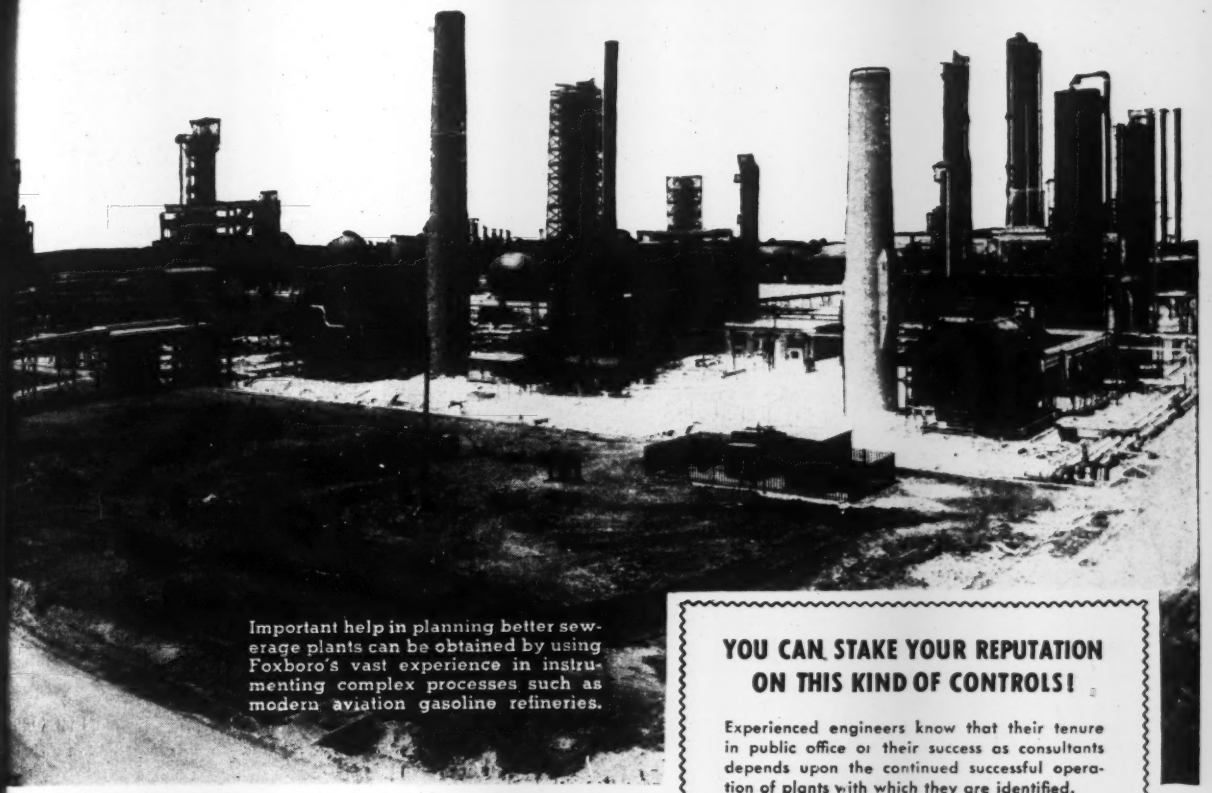

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AT first glance, these plants seem worlds apart. But engineers know that the production of petroleum products and the treatment of sewage have this in common: both are exacting processes. Instrument control is as important to efficient sewage disposal processing as it is in the production of aviation gasoline!

That's why sanitation engineers are studying Foxboro Instrumentation methods that have been producing outstanding results in synthetic rubber plants, petroleum refineries, and other process industries.

Foxboro, with more than 30 years experience in scientific instrumentation, has laid the groundwork for accurate, low-cost control for your sewage disposal. Foxboro engineers are ready now to give you the benefit of this "on-the-job" experience for any sewage disposal or waterworks project you may be considering. Write or phone the nearby Foxboro Office for a detailed discussion. The **Foxboro Company, 142 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities.

YOU CAN STAKE YOUR REPUTATION ON THIS KIND OF CONTROLS!

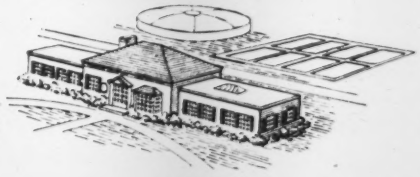
Experienced engineers know that their tenure in public office or their success as consultants depends upon the continued successful operation of plants with which they are identified.

When you incorporate Foxboro Instrumentation into your plans for a new sewage disposal plant you provide your client — the public — with the best possible assurance of economical yet efficient treatment.

Foxboro Instruments provide for the integrated control of all steps in the sewage disposal process including:

- LIQUID LEVEL — grit chambers and mixing or elutriation tanks
- FLOW — influent, effluent, sludge and gas
- PRESSURE — filters, gas tanks and boilers
- TEMPERATURE — water, digester tanks, incinerators and boiler plants

Foxboro Instruments are also designed for integrated control of water treatment systems.



FOXBORO INSTRUMENTATION

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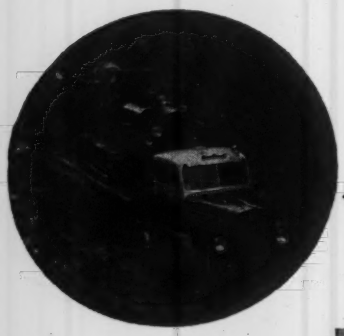

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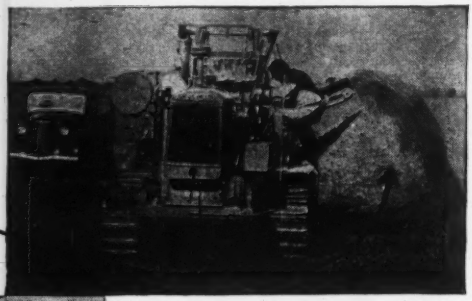

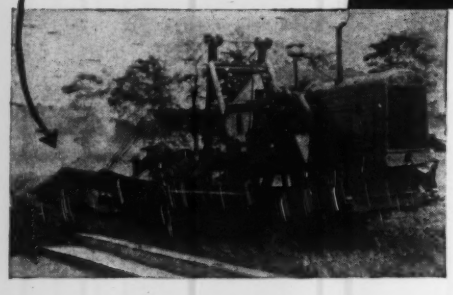

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BRANCH WAREHOUSE—Gary, Ind.

PUBLIC BLDGS. (Propos...

†**Nev., Eureka**—Pub. H... Phelan Bldg., 760 Mark... Calif., 15 stopgap fa... Nev. 26177.

★†**N. C., Camp Butner**—... U. S. Eng., Post Off... Ga., addnl. construction... station hospital to gen... facilities of post prop... valescent center, ... $1,780,000.

★†**N. H., Manchester**—... Vermont Ave. between ... Wash. 25, D. C., 150-be... erans hospital, Smyth ... 157.

†**N. M., Santa Fe**—U... querque, expanded bldgs. ... department and WAC ... Hospital plant. $245,000

★†**Okla., Guymon**—Cal... Franklin St., Boston, ... $1,500,000. Defense Plant ... CD 11/6. ENR 11/9.

†**Ore., Klamath Falls**—Pub... Auth., NHA, Skinner Bl... Sts., Seattle 1, Wash., rejected bids Mar. 14, 50 prefabricated single family dwelling units, Proj. 35310. CD 1/5—ENR 1...

★**Pa., Chambersburg**—Bo... mgr., Utilities, Boro Hall, making plans municipal lighting plant alterations, addns., $600,000. A. C. Wood, 1411 Walnut St., Phila., engr.

†**Utah, St. John**—Pub... Housing Auth., NHA, 760 Market St., San Francisco, ... plans by Ashton & Evans & Lowell ... Parish, 312 Beneficial Life Bldg., Salt Lake City, 75 temporary family dwelling units, CD 2/8—ENR 2/15.

S. D., Redfield—State, Pierre, plans ward bldg. at State School for Feeble Minded, $152,000.

S. D., Yankton—State, Pierre, employees' bldg. at State Hospital. $135,000.

†**Tex., El Paso**—U. S. Eng., Albuquerque, N. M., addnl. bldgs., for WAC occupancy, $150,000.

†**Va., Langley**—Federal Agency, 18 and F Sts. N.W., Wash. 25, D. C., 2 story recreation bldg. at Langley, Va. Memorial Aeronautical Laboratory. $111,336 allotted.

★**Alta., Edmonton**—Wartime Housing Ltd., 55 York St., Toronto, Ont., plans by G. H. MacDonald, Tegler Bldg., 400 houses, 9502 118 Ave. About $1,200,000. CD 3/5—ENR 3/8.

N. B., Moncton—City, City Hall, hospital exten., King St. About $200,000.

Ont., Amherstburg—Municipality, ... school, $150,000.

Ont., Kitchener—Wartime Housing, Ltd., 25 York St., Toronto, and city of Kitchener, J. Meizinger, mayor, City Hall, 100 low-rented houses. About $400,000.

Ont., Toronto—Municipality, converting old Grace Hospital, William Houston Public School and Eglinton Hunt Club into housing units. $150,000.

Que., Drummondville—Province of Quebec, c/o Dpt. of Attorney General, Quebec City, court house, $200,000. Dpt. P. Wks., Quebec City, engrs.

Que., Gaspe—Province of Quebec, c/o Dpt. Attorney General, Quebec City, court house, $150,000. Dpt. P. Wks., Quebec City, engrs.

Que., Hull—Province of Quebec, c/o Dpt. Attorney General, Quebec City, court house, $250,000. Dpt. P. Wks., Quebec City, engrs.

Que., Quebec City—Municipality, F. X. Chouinard, clk., plans by E. Hamel, City Hall, reconstructing St. Roch Market on Crown St. $50,000.

Que., Quebec City—Municipality, plans by F. Caron, 142 St. John St., 200 dwellings, $400,000.

Que., Rouyn—Province of Quebec, c/o Dpt. Attorney General, Quebec City, court house, $150,000. Dpt. P. Wks., Quebec City, engrs.

Sask., Athabasca—Province of Saskatchewan, c/o Ministry of Resources, Regina, exten., imprv. power plant and distr. sys. $40,000 plus.

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BLIC BUILDINGS (Contracts Awarded, Cont'd.)

ask., **Cumberland**—Province of Saskatche-, Regina, filleting and cold storage plant, 000. Dpt. P. Wks., Regina, archts.

ask., **Jasper**—Province of Saskatchewan, Ministry of Resources, Regina, exten., prv. power plant and distr. sys. $40,000.

ask., **McLennan**—Province of Saskatche-, c/o Ministry of Resources, Regina, n. imprv. power plant and distr. sys. 000.

ask., **Peace River**—Province of Saskatche-, c/o Ministry of Resources, Regina, n. imprv. power plant and distr. sys. 000.

DS ASKED

Bids Asked March 26

N. Y., **Brooklyn**—Comr. Water Supply, & Electricity, Municipal Bldg., New k, Zone 7, complete installation 2 boil- and blower equip. in main and reserve h pressure pump. stations. Plans de- t 50c.

Bids Asked March 26

N. S., **Baccaro**—Secy. Dpt. Munitions & ply, Ottawa, Ont., constructing Operation g. 5, Power House Bldg. 6, Boiler House g. 7, at W/T Station. About $75,000.

Bids Asked March 29

†Wash., **Seattle**—Pub. Housing Auth., HA, Skinner Bldg., 5 and Union Sts., e 1, 314 housing units in 2 story frame es., in Sands Point Dist., Wash. 45319-N. Clelland & Jones, Republic Bldg., 2 and e Sts., Zone 1, archts.

Bids Asked About April 1

Wash., **Seattle**—School Dist. 412, N. 102 and Aurora Ave., Zone 33, 1 story, brick adview School addn.; 2 story, brick Lake y School addn.; 1 story, brick adminis- ion bldg $165,000. W. Wallis, Lyon, dg., 3 and James Sts., Zone 4, archt.

Bids Asked April 4

, Ont., **Toronto**—Secy. Dpt. P. Wks., Ot- awa, superstructures active treatment d outpatients bldgs., hospital develop- nt, Sunnybrook Park. $900,000. Plans posit $200. CD 9/20—ENR 9/28.

Bids Asked April 11

La., **Monroe**—City, City Hall, P. A. Poag, y treas., City Hall, power piping and wer wiring in connection with power t imprvs., Contrs. 11 and 12. Burns & Donnell Eng. Co., 107 West Linwood vd., Kansas City 2, Mo., engr.

Bids Asked in April or May

†Pa., **Washington**—National Supply Co., W. Hart, in charge, Grant Bldg., Pitts- rgh, Pa., rehabilitating, altering forge plant r War Dpt., Standard Oil Bldg., Balti- ore, Md. $725,000, with equip. $1,800,000. gig Engineers, 1500 Walnut St., Phila., grs.-archts. CD 2/20—ENR 3/1.

Bids Asked About April 2

†Wash., **Kennewick**—Pub. Bldgs. Admin., and F Sts. N.W., Wash. 25, D. C., 50 bed spital, Wash. 45-299. **FWA.** Naramore, ain, Brady & Johnson, 2800 Smith Tower, attle, Zone 4, archts. CD 3/12—ENR 3/15.

OW BIDDERS

†Ala., **Birmingham** — Reconstruction nance Corp., 811 Vermont Ave. N.W., ash. 25, D. C., Mar. 7, storage warehouse, m A. L. Sullivan, 407 48 St. S., **$65,652.** Franzheim, 728 17 St., Wash., D. C., rchts.

†D. C., **Wash.**—Catholic University of merica, 620 Michigan Ave. N.E., Mar. 7, raduate student nurses quarters, from edin Constr. Co., 820 Michigan Ave., **$218,-00. FWA.** CD 3/2.

†D. C., **Wash.**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., ash. 25, D. C., Mar. 14, 2 addnl. stories on dg. 213, Naval Gun Factory, Washington avy Yard, NOY 10749, from Hedin Constr. o., 820 Michigan Ave. N.E., **$524,000.**

†Md., **Bethesda (br. Wash., D. C.)**—Pub. ldgs. Admin., 18 and F Sts. N.W., Wash. . C., Mar. 13, health center bldg., Md. 045, from Schribereed Co., 615 3 St. S.E., ash., D. C. **$214,448.** CD 3/8.

Mass., **South Boston (Boston)**—Boston ousing Auth., 10 Post Office Square, Mar. , underground utilities sys. repairs, extens. nd addns., Old Harbor, from Edward M. atz, Inc., 25 Huntington Ave., Boston, 298,170.

†N. Y., **Fort Jay (br. New York)**—U. S. ng., 120 Wall St., New York, Zone 5, Mar. 3, headquarters bldg., from Ryan Constr. orp., 341 E. 79 St., New York, Zone 21. 162,617. CD 3/9.

CONTRACTS AWARDED

†Calif., **Berkeley**—Bd. Trustees Berkeley General Hospital, A. F. Maffly, supt., 2001 Dwight Way, 3 story, bsmnt., addn. to Berkeley General Hospital, Calif. 4-646N, o W. F. Lang, 3848 Grand Ave., Oakland. 475,900. **FWA.** CD 2/27—ENR 3/1, un- er LB.

†Calif., **Oakland**—Pub. Housing Auth., HA, 760 Market St., San Francisco, site mprvs., for 72 family dwelling units, and ommunity bldg., Calif. 4955-N, to Equity Contg. Co., 2287 Telegraph Ave., Berkeley. 184,896.

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PUBLIC BUILDINGS (Cont'd.)

†Calif., Point Loma (San Diego Yards & Docks, Navy D... stitution Ave. N.W., Was... Radio and Sound Lab... NOY 10928, to O. L. Ca... Bldg., San Diego. $53,...

†D. C., Wash.—Pub... and F Sts. N.W., Zon... wings to Temporary ... T-5, 17 St, and Tidal Ba... Simpson & Brother, Alex... CD 3/7—ENR 3/15.

★ **†Me., Portland**—Def... Vermont Ave. N.W., ... pairs, renovations bomb... Thompson Point, to P. A... 15 State St., Bangor. Est...

Minn., Jackson—City... City Hall, furnishing, ins... erating unit incl. necessa... cipal power plant, to W. ... Co., 1057 10 Ave. S.E., ... Bids 2/27. CD 2/7—ENR ...

†Mass., Camp Edwards—... James St., Boston, 60 ... tion bldgs., swimming ... letic facilities, miscella... 19-023-45-NEG-103, to C. ... 24 Dane St., Somerville. ... CD 3/7—ENR 3/15.

†Mo., St. Louis—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., test bldg., Naval Ordnance Plant, NOY 11950, to Gamble Constr. Co., 620 Chestnut St.

Mo., Webster Groves (St. Louis, Zone No. P.O.)—School Dist. of Webster Groves, Bd. Educ., F. L. Wright, pres., and L. A. Steg... supt. Schools, 16 Selma Ave., general contract 2 story, basmnt., L-shaped brick, concrete school, Elm St. between Ravine St. and Fox Pl., to Woermann Constr. Co., ... W. Pine Blvd., St. Louis, Zone 8. ... Bids 3/8. CD 2/27—ENR 3/8.

†Neb., Hastings—Bd. Educ., Hastings, schol addn., Neb. 25-139-F, to Ernest Rast & Son, 1815 Y St., Lincoln, approx. ... FWA. Davis & Wilson, Stuart Bldg., Lincoln, archts.

★ **†Nev., Hawthorne**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., 145 addnl. bldgs., etc. Spec. 15433, NOY 11089, to J. A. Terteling & Sons, Inc., 411 W. 5 St., Los Angeles, Calif., $3,881,196. CD 3/14, under LB.

★ **†Tenn., Murfreesboro**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., addnl. bldgs., to Virginia Engineering Co., Newport News, Va., $1,537,000. CD 2/15—ENR 2/22.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ala., Gorgas—Alabama Power Co., Alabama Power Bldg., Birmingham, soon let contract twenty 1 story, 5 room frame houses, Martin & Lewis, Title Guarantee Bldg., Birmingham, archts. CD 10/26—ENR 11/2.

★ **Colo., Denver**—Jewish Hospital Assn., c/o M. B. Schwayder, 1050 S. Bway., hospital, $750,000. Funds now being raised.

Ill., Chicago—5130 Calument Building Corp., c/o C. W. Nicol, archt., 23 E. Jackson Blvd., thirty-six 3 story flats, $210,000.

Ill., Chicago—S. W. Wabash Corp., c/o C. J. Kastrop, archt., 7346 Madison St., Forest Park, 24 four room housing, Wabash and 61 St. $160,000.

Ill., Chicago—Wabash Building Corp., c/o C. J. Kastrup, archt., 7346 Madison St., Forest Park, 32 four room suites, 2 story housing, Wabash and 61 St. $185,000.

N. J., Elizabeth—Westminster Presbyterian Church, O. W. Buschgen, D.D., 234 Bradford Rd., preliminary sketches completed by W. Thomas & H. E. Wagoner, 1700 Walnut St., Phila., Pa. and C. G. Poggi, 287 Morris Ave., Elizabeth, repairing fire damage and construct church. $163,000.

Pa., Morrisville—Penn. Vally Construction, Inc., 20 N. Penna. Ave., making plans for detached residential development. $150,000.

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COMMERCIAL BUILDINGS (Proposed Work, Cont'd.)

Tex., Rio Grande City—A. N. Petty, c/o Petty Military Institute, Laredo, converting Fort Ringgold bldgs., facilities into Military School, $150,000.

Wash., Seattle—Crawford & Conover, 6800 8th Ave. N.E., Zone 5, forty-three 2 story, frame houses in Wedgewood addn. $279,500. A. Hutchings, Arctic Bldg., 3 and Cherry Sts., Zone 4, engr.

N. J., Newark—PLANT—Celanese Corp. of America, 90 Ferry St., soon lets contract, Bldg. 262 addn.

N. J., Newark—GENERATOR PLANT—★Pub. Ser. Gas & Electric Co., Park Pl., 100,000 kw. turbine-generator plant and 900,000 lb. per hr. boilers, at Essex General Station, $7,500,000.

N. J., Plainfield—MACHINE SHOP—Thul Machine Works, Thul Auto Parts, Inc., 200 Central Ave., 2 story, brick machine shop, $40,000 plws.

Ore., Pendleton—PLANT—Coca Cola Bottling Co., Walla Walla, Wash., plans by E. G. Morgan, First National Bank Bldg., Walla Walla, Wash., bids soon 100x180 ft., rein.-con. bottling plant. Over $40,000.

Pa., Phila.—SHOP—D. Ginsberg, 5342 Berks St., plans completed junk shop, Torresdale Ave. and Wakeling St. $40,000.

Pa., Phila.—WAREHOUSE—Psaki Bros., 7 and Catherine Sts., plans completed by L. A. Manfredi, 2228 Mifflin St., warehouse. $40,000.

R. I. Cranston (br. Providence)—PLANT—Warwick Club Ginger Ale Co., 108 Pond St., West Warwick, will not construct 2 story, brick, concrete bottlong plant. $50,000. Pepsi-Cola Bottling Co. of R. I., lessee. Project abandoned.

Tex., Bay City—PLANT—Bay City Rice Drying Co., in office of Central Engineering Co., engr., Larendon Bldg., 2110 Texas Ave., Houston, soon lets contract rice drying plant. CD 3/7—ENR 3/15.

Tex., Brownsville — WAREHOUSE — Feld-Reynolds Warehouse Corp., 501 Middle St., Houston, plans by Finger & Rustay, 711 National Standard Bldg., Houston, warehouse, $70,000.

Tex., Fort Worth — WAREHOUSE — Geo. Leviton, 920 W. Weatherford St., 75x180 ft., 1 story, steel, sheet metal, concrete warehouse. $45,000.

Tex., Pharr — PLANT — Latin-American Assn., Pharr, 1 story, vegetable and citrus processing plant, brick, rein.-con. $40,000.

Tex., Raymondville — PLANT — D. W. Jones, c/o Hecht-Campbell, Inc., 228 S. 7 St., ice plant. $40,000. Site purchased.

Wis., Wisconsin Rapids — FACTORY — Prentiss-Wabers Prod. Co., 3 St. N., plans by A. F. Billmeyer & Son, 172 2 St. N., 1 story, 125x330 ft., brick, steel, rein.-con. factory, concrete fdn.

Que., St. Jerome—Lapointe Hotel Co., St. Jerome, plans by L. Nicholas, 430 Blvd. Melancou, reconstructing dance hall, grill and wings at Lapointe Hotel, 255 Labelle St. About $150,000.

Que., Ste. Marguerite—Esterel Resorts, Ltd., P. Sanguinet, pres., reconstructing bldgs., incl. stores, garage, laundry, hotel offices, theatre, cabaret and staff quarters, destroyed by fire. About $300,000.

Que., Verdun—Verdun Catholic School Comn., M. Bertrand, secy., 159 Craig St., plans Bernadette Saubirous School for Boys, Brault and Richard Aves. $175,000.

CONTRACTS AWARDED

Calif., Long Beach—Wm. C. Warmington, 8330 W. 3 St., Los Angeles, 99 frame, stucco dwellings, at Lakewood City. Owner builds, approx. $400,000. H. Gibbs, 441 E 1 St., archt.

Calif., Menlo Park—Pacific Homes, Inc., 859 San Mateo Dr., San Mateo, forty-two 1 story frame residences. Owner builds. Over $150,000.

Conn., Middletown—Jarvis Realty Co., Center St., 30 or more housing development South Farms, Frisbie, Asylum, Roberts, Laurel and Linden Sts., to The Alexander Jarvis Co., Center St., Manchester. Est. $225,000.

Utah, Salt Lake City—Denver & Rio Grande Western R. R. Co., A. E. Perlman, ch. engr., Rio Grande Bldg., Denver 1, Colo., emergency hospital for railroad employees, to Ellis W. Barker, Newhouse Bldg. Bids 2/21.

Calif., San Mateo—Belle Haven Realty Co., 1182 Market St., San Francisco, thirty-eight 1 story, frame residences. Owner builds. $190,000.

Ill., River Forest—John Cummings Lindop Real Estate, Inc., 630 N. Harlem St., thirty-six 3 story, 200x165 ft., brick apartments. Owner builds. $190,000. CD 2/20—ENR 3/1.

Wash., Seattle — Standards Homes, Inc. Vance Bldg., Zone 1, 23 one story, bsmnt., 26 x 49 ft. duplexes, W. 56 St., between 28 and 30 Aves. N.W. and W. 56 St. and 14 Ave., N.W., and on Queen Anne Hill, day labor. $184,000. J. I. Mattson, 719 2 Ave., Zone 4, archt. CD 3/16.

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PITTSBURGH . . . PENNA.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ala., Tallassee—PLANT—H. Pembleton, archt., 2621 Highland Ave., Birmingham, soon lets contract quick freeze locker plant, for A. S. Noble & Associates, Tallassee. $75,000.

Conn., Waterbury — PLANT — Benrus Watch Co., Inc., 30 Cherry St., plans by H. T. Moekel, 35 Hillcrest Ave., Naugatuck, 1 story, 35x50 ft. boiler plant, 100 ft. stack, 1 story 30x40 ft. garage, brick, steel, concrete. $40,000.

Ill., Chicago—FACTORY—Bastian Blessing Co., 4201 W. Pershing Rd., plans by Fox & Fox, 549 W. Randolph St., and bids soon 1 story, 60x330 ft., brick, concrete, steel factory addn., Peterson Ave. and Keeler St.

Ill., Chicago—PLANT—Columbia Malting Co., 141 W. Jackson Blvd., malting plant addn., brick, concrete, steel, Indianapolis Blvd. and 105 St. $200,000.

Md., Baltimore — WAREHOUSE — Crout, Snyder & Cransdale, engrs., 25 E. Lexington St., soon lets contract, 2 story 45 x 130 ft., steel storage warehouse, for Gordon Lawn Paper Box Co., 1629 Warner St., $45,000.

Minn., Minneapolis — FACTORY — Lewis Bolt & Nut Co., F. T. Robertson, pres., 504 Malcolm Ave. S.E., plans by Toltz, King & Day, 1509 Pioneer Bldg., St. Paul, 60x180 ft. and 56x120 ft. brick, steel factory bldgs., 504 Malcolm Ave. S.E. $175,000.

Minn., Robbinsdale—PLANT—Robbinsdale Frozen Foods Locker, J. H. Bartlett, 2926 Knox Ave. N., Minneapolis (temporary office 4074 W. Broadway, Robbinsdale), food locker plant. $50,000, incl. equip.

N. J., Atlantic City — WAREHOUSE — Owner, c/o A. L. Brooks, archt., 4801 Ventnor Ave., plans completed 2 story, brick, steel warehouse. $50,000-$75,000.

N. J., Camden—SALES and SERVICE—Berglund Motor Co., Admiral Wilson Blvd. and 17 St., soon lets contract automobile sales and service bldg. $40,000. F. H. Radey, 101 N. 7 St., archt.

N. J., Camden—WAREHOUSE—Minters Distributors, 9 S. 34 St., bids soon 2 story warehouse. $50,000.

BIDS ASKED

Bids Asked March 26

Mass., Gloucester—WAREHOUSE—F. M. Gill, archt., 1 Gloucester Ave., brick, steel storage warehouse, for North Shore Ice & Cold Storage Co., Mr. Sandler, 191 Main St. Over $40,000.

Bids Asked March 27

Que., Granby—FACTORY—M. W. Roth, archt., 204 Notre Dame St. W., Montreal, factory addn., for Stark Brothers Ribbon Corp. of Canada, Ltd., 400 Courcelette St., A. B. Grossman, mgr. CD 2/15—ENR 3/1.

CONTRACTS AWARDED

Ala., Birmingham—PLANT—Tenn. Coal Iron & R. R. Co., Brown-Marx Bldg., installing turbo blower and altering bldg. to house same, own forces, **$70,000.**

Ala., Mobile—PLANT—Industrial Ice Co., Prichard, ice plant, to H. L. Edgell, 7 Benedict Rd., **$40,185.** F. W. Clark, First National Bank Bldg., archt. Bids 2/26.

Ala., Mobile—PLANT—Polar Ice Co., Inc., 654 S. Royal St., ice plant, to H. L. Edgell, 7 Benedict Rd., **$49,500.** F. W. Clark, First National Bank Bldg., archt.

Calif., San Bernardino—DIESEL ENGINE SHOP—Atchison, Topeka & Santa Fe Ry. Sys., G. W. Harris, ch. engr., 80 E. Jackson Blvd., Chicago 4, Ill., steel frame diesel engine shop addn., and concrete repairs pits, to Stronach Constr. Co., 115 N. Robertson St., Beverly Hills **$40,000.**

Calif., South Gate—FACTORY—Brisbane & Co., 8653 Atlantic Ave., steel frame factory addn., 5 crane runways. Owner builds, **$50,000.** Jas. C. Barr, 3404 S. Flower St., Los Angeles, engr.

★**Calif., Tracy**—FACTORY—H. J. Heinz Co., 2900 San Pablo Ave., Berkeley, 2 and 3 story, 300 x 800 ft., brick, concrete, steel food processing factory, to W. A. Bechtel Co., 155 Sansome St., San Francisco. Est. over **$1,500,000.** CD 2/8—ENR 3/8, under Postwar Projects.

Conn., East Hartford—FACTORY CLINIC—Pratt & Whitney Div., United Aircraft Corp., 400 Main St., 1 story, 55x90 ft., brick, steel factory central clinic, to Wadhams, May & Carey Co., 15 Lewis St., Hartford. Est. **$40,000.**

Fla., Orlando—PLANT—American Machinery Corp., Orlando, bomb plant, to James F. Wellman, Winter Park, **$100,000.**

Ill., Chicago — PLANT — International Printing Ink Co., 2211 Elston Ave., 3 story, 177x58x99 ft., brick, concrete, steel plant bldg. addns., 30x45 ft. varnish plant, and remodel present bldg., to Avery Brundage Co., 11 S. LaSalle St. Est. **$350,000.** A. M. Kinney, Inc., Enquirer Bldg., Cincinnati, O., engr.

Ia., Des Moines—FACTORY—New Monarch Machine & Stamping Co., 406 SW 9 St., factory, to Wm. Knudson & Sons, 611 Flynn Bldg. Approx. **$90,000.** Kraetsch & Kraetsch, Davidson Bldg., archt.

Mass., Medford—FACTORY—Ralph's Potato Co., 26 North Union St., Somerville, 2 story, 40 x 195 ft., brick factory, Mystic Valley Parkway, to M. Bratt, 28 Colburn Rd., Brighton. Est. **$40,000.** W. A. Dykeman, 31 Cornhill St., Boston, archt.

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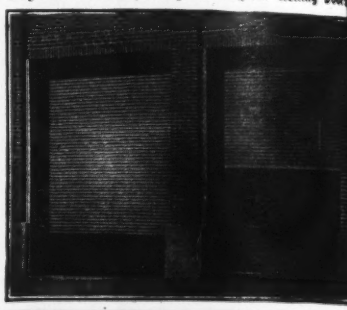

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DUSTRIAL BUILDINGS (Contracts Awarded, Cont'd.)

Mass., Springfield — WAREHOUSE — harles C. Lewis Co., 401 Liberty St., brick, f warehouse, to E. J. Pinney Co., Inc., Dwight St., Est. **$50,000.** CD 3/6—R 3/8.

Mo., St. Louis — FACTORY — American ve. Co., 2001 S. Kingshighway, Zone 10, story, 100x128x219x135 ft., stove factory dg. addn., brick, concrete, to Gamble nstr. Co., 620 Chestnut St., Zone 1, **$40,000.**

N. J., Atlantic City—PLANT—Atlantic y Electric Co., R. E. Swift, vice pres. and ni. mgr., Kentucky and Pacific Aves., nt addn. Owner builds. **$447,000.**

N. J., Clifton—FACTORY—Eastern Corru-ted Container Corp., 227 Clifton Blvd., story, 100 x 120 ft., brick, steel factory ddn., to Termo Const. Co., 109 Central Ave., enia. **$45,000.** W. Bartels, 272 Main St., akensack, archt.

N. J., Hillside (br. Ell: beth)—WARE-OUSE—Edgecomb Steel Co., 460 Hillside ve., 1 story, 55 x 152 ft. brick warehouse ddn., to D. O. Evans, 1445 N. Broad St., 5,000. L. Dennis, 1140 E. Jersey St., lizabeth, archt.

N. J., Irvington — FACTORY — Keystone amping Corp., 55 Cardier St., 1 story, ick, concrete factory addn., to Frank D. ainer & Son, Inc., 12 Smith St., Irvington, 2,000. G. Hechtel, 106 S. Durand Pl., rcht.

Pa., Phila.—PLANT—Heintz Mfg. Co., unt and Olney Ave., productory aircraft dg., to Henry E. Baton, Inc., 1717 San-m St., **$125,000.** Awarded 3/12.

Pa., Phila. — PLANT — Quaker Rubber rp., R. W. Stanley, supt., Comly and linor Sts., 1 and 2 story, brick, steel frame g. plant addn., to Harry Gilt Co., 2515 ermantown Ave., **$50,000.** Awarded 3/14.

Pa., Phila.—FACTORY—E. B. Evans Co., 4 N. 22 St., altering factory, to M. K. evens, 225 S. 15 St., **$50,000.** Awarded 3/5. Demchick, 220 S. 16 St., archt.

Pa., Phila.—OIL PLANT—Reading Co., E. Allen, ch. engr., C. L. Wenkenbach engr. charge of bldgs., Reading Terminal, lla., Zone 1, general contract oil plant pairs, to F. B. Davidson, 240 N. 16 St., 0,000. Bids 2/10, awarded 3/5. Radbilt l Co., 3 and Berks St., lessee. CD 1/31—NR 2/8.

Pa., Phila.—PLANT—Schneider Bros. Co., 2-20 Brown St., rebuilding mfg. bldg., to inzz Bros., 1618 Sellers St., **$125,000-$150,-0.** Awarded 3/6. CD 2/26—ENR 3/1.

Wis., Ellsworth—PLANT—Ellsworth Coop-rative Creamery Assn., Ellsworth, 1 story, x 50 ft., brick plant, 1 story, 25 x 40 concrete block boiler house, to J. S. eltzer & Son, 739 Pillsbury Ave., St. Paul, inn. CD 12/12—ENR 12/14.

W. Va. Fairmount—REPAIR SHOP—wens-Illinois Glass Co., 1510 N. Westwood ve., Toledo, O., machine repair shop, cen-al wash room alterations and addns., to ughes-Foulkrod Co., 1505 Race St., Phila., a., **$75,000.** Awarded 3/14.

N. W. T., Yellowknife—DIAMOND DRILL-G—Rich Group Yellowknife, Ltd., Yellow-ife, diamond drilling, to Boyles Bros., o owner. Est. **$125,000.**

Ont., Toronto—WAREHOUSE, etc.—Stand-rd Chemical Co., Ltd., 67 Young St., 1 ory, 100x135 ft., warehouse, and 1 story, x135 ft. office bldg., frame, brick walls, eet St. E., to Milne & Nicholls, Ltd., 57 loor St. W., about **$95,000.** Adamson & organ, 3 St. Thomas St., archt.

Que., Three Rivers—COALING PLANT—anadian Pacific Ry. Co., J. E. Armstrong, engr., Windsor Sta., Montreal, coaling ant, to Williams & Wilson, Ltd., 544 In-ector St., Montreal. Est. **$60,000.**

Que., Valleyfield — FACTORY — Beacon roducts, Ltd., 3181 W. St. James St., Mont-eal, 22 x 72 ft. steel, concrete block fac-ory, concrete fdn., to O. Cartier, 3 Bay t. Est. **$60,000.** Shorey & Kitchie, 2048 ilton Ave., Montreal, archts. J. A. Kearns, 414 Drummond St., engrs.

UNCLASSIFIED

ROPOSED WORK

Ark., North Little Rock—AMUSEMENT ENTER, etc.—Doc. Freeman, 119 Louisiana t., Little Rock, amusement center and park. 75,000.

Conn., Wallingford—PLAYGROUND, etc. —Wallingford Boro, Municipal Office, Ward-ns & Burgesses, playground and recrea-onal facilities, West Side Field, $25,000.

Idaho — TRANSMISSION LINE — Utah ower & Light Co., Kearns Bldg., Salt Lake ity, Utah, 55 mi. transmission line serving eneva, Raymond, Pegram and Border. $50,-00. J. A. Hale, Kearns Bldg., Salt Lake ity, Utah, ch. engr.

Louisiana—OIL PIPELINE—The Gulf Re-ning Co., Gulf Bldg., Houston, Tex., install-g 4 in. oil pipeline under and across ayou Blue at point about 10.5 mi. above outh of waterway, near Cut-Off; dredging ip, installing clusters of piles, constructing imber wharf on timber pile fdn., in Gulf ntracoastal Waterway, Bourg-Larone Cut-ff Mississippi River-Atchafalaya River Sec-on, southeast bank central to point about 900 ft. west of Bayou Lafourche, near arose, approx. 35.72 mi. west from Harvey ock, both LaFourche Parish.

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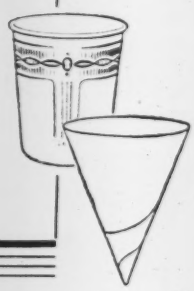

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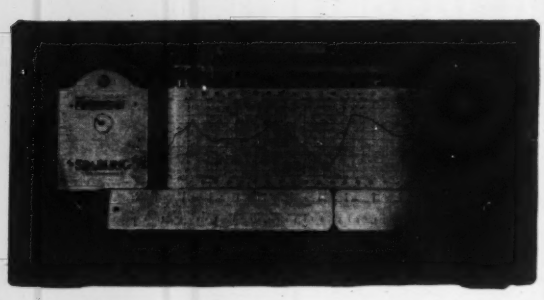

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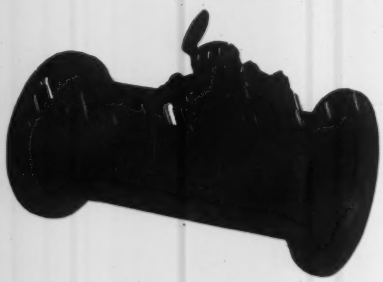

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Mass., Amherst—MEM... AL FIELD... —Trustees of Amher... college, H... Thatcher, ground supt... Amherst ... lege, plans completed b... A. Shirley ... Beacon St., Boston b... ion Co., ... memorial field and me... at corner ... 75 sq. ft. base paved ... stone area ... 20 ft. diam. granite ba... memorial ... $100,000.

Minn., Zumbrota — S... NICE CONNE... TIONS—Goodhue Count... operative E... Assn., Zumbrota, s... connec... $25,000 HEA allot.

N. C., Charlotte—M... ORIAL PARK... Charlotte Park Assoc., ... Wm. H. Bar... hardt, chn., Charlotte, m... rial park ... ation center) on 110 ... along Sugar ... Creek between East H... and Princ... Ave., incl. 75x250 ft. po... open air thea... pavilion, ball fields, la... walks, tra... $400,000. W. W. Hook ... mmercial Ba... Bldg., archt. H. B. Burs... 2035 Beverly ... landscape engr.

N. C., Raleigh-Durham ... AIRPORT BLDG... —Raleigh-Durham Airp... Auth., J. ... Swain, pres., Raleigh-Durham Airp... Raleigh, administration bldg. or terminal ... $150,000-$200,000.

†**N. Y., West Point**—POWER LINE... U. S. Eng., 120 Wall St., New York ... 5, bids soon relocation power line, $2...

R. I., Newport—BEACH IMPROVEMENT... —City Planning Dpt., City Hall, ... Easton's Beach. $75,000.

†**Tex., Fort Worth**—HANGAR—U. S. Eng... 231 W. Main St., Denison, rejected ... hangar, etc. Type HANGAR-A, Serial ... 41-242-45-99. CD 2/13—ENR 2-15, und... LB.

Texas—ELECTRIC DISTRIBUTION LINE... —Taylor Electric Cooperative, Merkel, so... lets contract 105 mi. rural electric dis... line extens., Taylor, Nolan, Callahan, Jo... Shackelford and Fisher Counties. $1... Freese & Nichols, 407 Capps Bldg., Fo... Worth, engrs. CD 1/31—ENR 2-3.

Tex., Fredericksburg — AIRPORT—Gi... lespie Co., c/o Judge, voted $95,000 bon... airport, incl. emergency landing fa... hangar. CD 2/28.

★†**Tex., San Antonio** — AUTOMATI... SPRINKLER SYSTEMS—U. S. Eng... Fort Sam Houston, install automati... sprinkler sys., at San Antonio Air Depot... $896,981.

Wis., Marinette—BOAT PLANT—Kargar... Boat & Engine Co., 2246 W. Logan St... Chicago, Ill., boat mfg. bldg.

BIDS ASKED

Bids Asked March 30

†**Wash., Lawrence**—DRIFT BARRIER—... U. S. Eng., 800 Third Ave., Seattle, recon... structing drift barrier on Nooksack Riv... involving pile driving, Neg. 1112.

†**Tex., Houston**—INSTRUMENT LANDING... SYSTEM—Civil Aeronautics Admin., Bo... 1689, Fort Worth, Zone I, instrument landi... ing sys., at Ellington Field. Plans-depos... $25. C. R. Horon, ch. engr.

Bids Asked April 2

†**Ariz., Winslow**—AIRPORT—Civil Aero... nautics Admin., 1500 4 St., Santa Monica, ... Calif., reconstructing pavement, Winslow Air... port, Prop. 6-45-260. Over $25,000.

Bids Asked April 4

Newfoundland, St. John's—WHARF—Secy... Dpt. Munitions & Supply, Ottawa, Ont... wharf services Sites 10 and 17. About $250,... 000.

Bids Asked in April or May

Pa., Phila.—PIER—Baltimore & Ohio... R. R. Sys., A. C. Clarke, ch. engr., Balti... more and Charles Sts., Baltimore, Md.... Pier 24 addn., alterations. $75,000-$100,000.

Bids Asked

★**Texas**—PIPELINE CARRIER—Tennes... see Gas & Transmission Co., Commerce ... Bldg., Houston, 95 mi. 16 in. natural gas ... pipeline carrier from San Salvador field ... Agua Dulce. $2,600,000.

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NCLASSIFIED (Cont'd.)

W BIDDERS

†**Calif., Benicia**—SPRINKLER INSTALLATIONS—U. S. Eng., 74 New Montgomery St., Francisco, sprinkler installations at nicia Arsenal, Spec. 1855, from Geo. M. binson & Co., 451 Folsom St., San Fran- co, **$64,604.**

†**Calif., Oakland** — BARGE MOORING ACILITIES—U. S. Eng., 74 New Mont- mery St., San Francisco, barge mooring cilities, Spec. 1880-A, from Healy-Tibbitts nstr. Co., 1100 Evans Ave., San Francisco, **,600.**

†**Tex., Randolph Field**—HANGARS—U. S. g., Fort Sam Houston, Mar. 7, 3 hangars, m J. W. Bateson, 1103 Irwin-Keasler dg., Dallas, **$441,960.** CD 2/28.

†**Wash., Seattle** — TAXIWAY PAVING — S. Eng., 890 3 Ave., Seattle, Zone 4, Mar. asphalt cement and bituminous paving reconstructing taxiway at Boeing Field, g. 1106, from Northwest Precote, 7343 Marginal Way, Zone 8. **$48,103.**

ONTRACTS AWARDED

†**Ala., Maxwell Field (br. Montgomery)**— NWAY, etc.— U. S. Eng., Grant St. west Westwood St., Mobile, reseaing joints d sealing cracks in runway, taxiway and ron pavement, to Haigler Constr. Co., lanta Hy., Montgomery. **$42,900.**

†**Calif., Alameda**—HANGARS, etc.— Yards & Docks, Navy Dpt., 18 St. and onstitution Ave. N.W., Wash. 25, D. C., air- aft preservation hangars, transit sheds, aval Air Station, NOY 11599, to James I. arnes Constr. Co., 1119 Montana Ave., anta Monica, **$1,453,000.** CD 3/14, under B.

†**Calif., Richmond** — SHIPYARD BLDG. — J. Kaiser Co., Richmond, 1 story, 120x425 steel frame utility bldg. at Shipyard 3, H. H. Larsen Co., 64 South Park St., an Francisco. Est. over **$25,000.**

†**Calif., San Diego**—FLOOD LIGHTIING— ards & Docks, Navy Dpt., 18 St. and Con- itution Ave. N.W., Wash. 25, D. C., key all flood lighting, Naval Aviation Station, panish Bight, NOY 11617, to Stetson Elec- ic Co., 1026 N. McCadden Pl., Los Angeles, one 38, **$112,551.**

†**Calif., San Pedro**—FLOATING DRY- OCKS—Yards & Docks, Navy Dpt., 18 St. nd Constitution Ave. N.W., Wash. 25, D. C., concrete floating dry docks, NOY 11999, to E. Haddock Co., Ltd., 3538 E. Foothill lvd., Pasadena.

†**Conn., Stratford**—LIGHTING SYSTEM— S. Eng., 31 St. James Ave., Boston, Mass., irport lighting sys., No. 19-023-45-Neg-83, Anderson-Coffey Co., Inc., 22 Shawmut ve., Boston, Mass., **$43,387.** Bids 2/13. CD /13—ENR 2/22, under LB.

†**Mass., Hyannis** — BATHHOUSE — Town, d. Selectmen, Town Hall, 1 story, 30x500 frame, tile bathhouse, to T. L. Cottrell, iverside Dr., West Harwich, Est. **$25,000.** M. Gaffney, **43 Potter Ave.**, archt.

†**Nev., Las Vegas**—MOCK-UPS, etc.—U. S. ng., 751 S. Figueroa St., Los Angeles 14, alif., upper turret mock-ups, lower phase ock-ups and blister siding station mock- ps, at Las Vegas Army Airfield, to General onstr. Co., and J. Walter Johnson, 5205 ollywood Blvd., Los Angeles, Calif., **$47,- 42.**

†**Nev., Las Vegas**—RANGE—U. S. Eng., 51 S. Figueroa St., Los Angeles 14, Calif., anipulation range, incl. construction 12 lywood towers, ranging from 20 to 60 ft. igh, Army Airfield, to General Constr. Co., nd J. Walter Johnson, 5205 Hollywood lvd., Los Angeles, Calif., **$25,914.**

†**Nev., Las Vegas**—TARGET RANGE— S. Eng., 751 S. Figueroa St., Los Angeles 4, Calif., target range addns., at Las Vegas rmy Airfield, Inv. 252, to J. A. Klarquist, 18 S. Western Ave., Los Angeles, Calif., 43,000.

†**N. C., Camp Butner**—SPRINKLER SYS- EM—U. S. Eng., Post Office Bldg., Sa- annah, Ga., sprinkler sys. in several bldgs., Grinnell Co., Inc., 1430 W. Morehead St., harlotte, approx. **$140,000.** Bids 3/7.

†**N. J., Ventnor City** — BOARDWALK — entnor City, City Hall, rebuilding 4,000 ft. oardwalk, repairing Ventnor City fishing er, to O. Hansen, Ventnor City, **$53,175.** ids 2/26, awarded 3/7.

†**Pa., Bristol**—RUNWAY, etc.—Fleetwings, nc., Bristol, constructing 1 runway, re- urfacing runway, to J. D. Morissey, 9119 rankford Ave., Phila., **$35,000-$50,000.** warded 3/12.

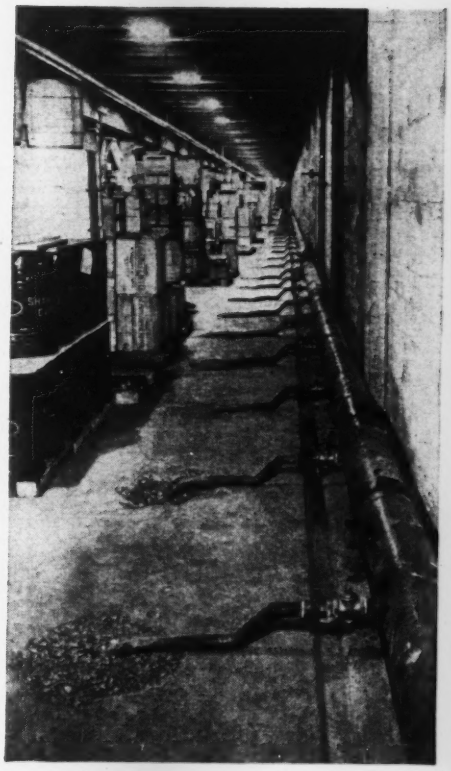
†**R. I., North Kingston**—ENGINE TEST ELLS—Yards & Docks, Navy Dpt., 18 St. nd Constitution Ave. N.W., Wash. 25, C., engine test cells, Naval Air Station, OY 10960, to William L. Crow Constr. Co., 1 Park Ave., New York, N. Y. **$274,334.** D 2/21.

†**B. C., Esquimalt**—DOCKYARD IMPROVE- ENTS—Secy. Dpt. Munitions & Supply, ttawa, Ont., dockyard imprvs., incl. Recti- er Bldg. 172, refitting and dockyard jetties, harf services, etc., for Dpt. Natl. Defense Sea), Ottawa, Ont., to Commonwealth onstr. Co., Ltd., 670 Taylor St., Vancouver, **4,958.** Bids 1/15. CD 1/2—ENR 1/4.

†**B. C., Vancouver**—GUN TEST RANGE— pt. Munitions & Supply, Ottawa, Ont., achine gun test range bldg., etc., to E. H. hockley, 5611 Elm St. **$105,945.**

Proposal Advertisement see p. 190 & 206
Postwar Projects see p. 134

WAREHOUSE BASEMENT *Flooded every time the river rose* NOW KEPT **DRY** BY



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THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC. · MUNSEY BLDG., WASH. D.C.

OFFICIAL PROPOSALS

Bids: April 4 (361)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of Chapter 63 Laws of 1936, as amended, and special provisions for projects financed with federal funds, sealed proposals will be received until one o'clock p.m., eastern war time, which is twelve o'clock noon, eastern standard time, on the fourth day of APRIL, 1945, by Henry A. Cohen, Director, Bureau of Contracts & Accounts, 14th Floor, State Office Bldg., Albany, N. Y., for the construction of the following project in NASSAU COUNTY.

Contract No.	Name of highway and miles	Type	Deposit for plans	Bid deposit	Priority rating
DA.88. 45-1	Marcus Avenue Access Road to Sperry GyroscopeCo.,Inc. 0.90 mile	Concrete 9" Th. x 33'	$5	$7,000	Serial #131,762 AA. 3

Maps, plans, specifications, and estimates may be obtained at the office of the Department of Public Works, Bureau of Contracts & Accounts, Albany, N. Y., and at the office of the District Engineer, J. J. Darcy, Montauk Highway at Little East Neck Road, Babylon, Long Island, N. Y., and may be seen at the office of the State Department of Public Works, State Office Building, Room 898, Worth and Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement, and to the special provisions applying to projects financed with federal funds.

Proposal for this contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. This proposal must be accompanied by cash, draft or certified check payable to the order of "State of New York, Commissioner of Taxation & Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

Minimum Wage Rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Nassau	$.87½	$.87½	$.87½

UNLESS SHOWN OTHERWISE IN THE ITEMIZED PROPOSAL FOR THIS PROJECT.

The right is reserved to reject any or all bids.

CHAS. H. SELLS
Supt. of Public Works

Bids: April 3 (365)

Painting East and West Walls of Columbia Street Pier Shed

THE PORT OF NEW YORK AUTHORITY
PORT AUTHORITY GRAIN TERMINAL
FOOT OF COLUMBIA STREET AT
GOWANUS BAY
BROOKLYN, N. Y.

CONTRACT GT-13

Sealed proposals for the above work will be received at the office of the Executive Director of The Port of New York Authority, 111 Eighth Avenue, New York 11, N. Y., until 11 o'clock, on the morning of Tuesday, April 3, 1945, at which time they will be publicly opened and read in the Auditorium of the Authority at the same address.

Contract documents may be seen at the office of the Chief Engineer, The Port of New York Authority, Room 1538, 111 Eighth Avenue, New York City, and copies will be furnished upon deposit of $5.00 per set. The deposit will be remitted if the documents are returned in good condition, not later than thirty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Howard S. Cullman,
Chairman.

New York, March 22, 1945.

(Continued on page 206)

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